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Charles B. Harris

FORTY-SEVENTH ANNUAL REPORT

OF THE

Indiana State Board of Agriculture

VOLUME XXXIX—1897-98

INCLUDING THE

PROCEEDINGS OF THE ANNUAL MEETING, 1898; REPORTS OF COUNTY AND DISTRICT SOCIETIES,
STATE MEETINGS OF SWINE BREEDERS, WOOL GROWERS, POULTRY ASSOCIATION,
FARMERS' INSTITUTES, EXPERIMENT STATION, FARMERS' INSURANCE
UNION, STATISTICS ON VEGETABLES AND CEREALS, AND
TABLE OF COMMERCIAL FERTILIZERS.

TO THE GOVERNOR.

INDIANAPOLIS:
WM. B. BURFORD, CONTRACTOR FOR STATE PRINTING AND BINDING.
1898.

THE STATE OF INDIANA,
EXECUTIVE DEPARTMENT,
August 20, 1898.

Received by the Governor, examined and referred to the Auditor of State for verification of the financial statement.

OFFICE OF AUDITOR OF STATE,
INDIANAPOLIS, August 20, 1898.

The within report, so far as the same relates to moneys drawn from the State Treasury, has been examined and found correct.

A. C. DAILY,
Auditor of State.

AUGUST 20, 1898.

Returned by the Auditor of State, with above certificate, and transmitted to Secretary of State for publication, upon the order of the Board of Commissioners of Public Printing and Binding.

CHAS. E. WILSON,
Private Secretary.

Filed in the office of the Secretary of State of the State of Indiana, August 20, 1898.

W. D. OWEN,
Secretary of State.

Received the within report and delivered to the printer this 20th day of August, 1898.

THOS. J. CARTER,
Clerk Printing Bureau.

MEMBERS

OF THE

Indiana State Board of Agriculture

1897.

1st District—JOHN C. HAINES, Lake, Spencer County.
2d District—MASON J. NIBLACK, Vincennes, Knox County.
3d District—W. W. STEVENS, Salem, Washington County.
4th District—J. W. LAGRANGE, Franklin, Johnson County.
5th District—H. L. NOWLIN, Lawrenceburg, Dearborn County.
6th District- KNODE PORTER, Hagerstown, Wayne County.
7th District- H. B. HOWLAND, Howlands, Marion County.
8th District—CHARLES DOWNING, Greenfield, Hancock County.
9th District—CLAUDE MATTHEWS, Clinton, Vermillion County.
10th District—JOHN L. DAVIS, Crawfordsville, Montgomery County.
11th District—M. S. CLAYPOOL, Muncie, Delaware County.
12th District—MORTIMER LEVERING, Lafayette, Tippecanoe County.
13th District—JOHN L. THOMPSON, Gas City, Grant County.
14th District—C. B. HARRIS, Goshen, Elkhart County.
15th District—AARON JONES, South Bend, St. Joseph County.
16th District—JAS. E. McDONALD, Ligonier, Noble County.

OFFICERS FOR 1897.

C. B. HARRIS, *President.*

W. W. STEVENS,
Vice-President.

E. H. PEED,
General Superintendent.

CHAS. F. KENNEDY.
Secretary.

E. J. ROBISON,
Treasurer.

Executive Committee.

Messrs. JONES, DOWNING, THOMPSON and NIBLACK.

A TABLE SHOWING THE OFFICERS, PLACE AND PREMIUMS PAID OF EACH FAIR HELD BY THE STATE BOARD OF AGRICULTURE.

Year.	President.	Secretary.	Treasurer.	General Superintendent.	Place of Fair.	Premiums Paid.
1852	Gov. Joseph A. Wright	John B. Dillon	Royal Mayhew	W. T. Dennis	Indianapolis	
1853	Gov. Joseph A. Wright	John B. Dillon	Royal Mayhew	J. J. Bingham	Lafayette	
1854	Gov. Joseph A. Wright	Wm. T. Dennis	Royal Mayhew	W. T. Dennis	Madison	
1855	Gen. Joseph Orr	John B. Dillon	S. A. Buell	Calvin Fletcher, Jr	Indianapolis	$2,753 00
1856	Dr. A. C. Stevenson	Ignatius Brown	S. A. Buell	Calvin Fletcher, Jr	Indianapolis	4,225 00
1857	Dr. A. C. Stevenson	Ignatius Brown	S. A. Buell	Calvin Fletcher, Jr	Indianapolis	4,127 00
1858	Dr. A. C. Stevenson	John B. Dillon	Thomas H. Sharp	Calvin Fletcher, Jr	Indianapolis	
1859	George D. Wagner	John B. Dillon	Thomas H. Sharp	James L. Bradley	New Albany	6,163 00
1860	George D. Wagner	Wm. T. Dennis	Thomas H. Sharp	James L. Bradley	Indianapolis	3,827 00
1861	D. P. Holloway	Wm. T. Dennis	H. A. Fletcher		No Fair	
1862	James D. Williams	W. H. Loomis	H. A. Fletcher	J. A. Grosvenor	Indianapolis	3,994 00
1863	A. D. Hamrick	W. H. Loomis	H. A. Fletcher	J. A. Grosvenor	Indianapolis	
1864	Stearns Fisher	W. H. Loomis	Francis King	W. H. Loomis	Indianapolis	4,121 00
1865	Stearns Fisher	W. H. Loomis	Carlos Dickson	J. A. Grosvenor	Fort Wayne	4,078 00
1866	Stearns Fisher	W. H. Loomis	Carlos Dickson	J. A. Grosvenor	Indianapolis	
1867	A. D. Hamrick	A. J. Holmes	Carlos Dickson	J. B. Sullivan	Terre Haute	6,331 00
1868	A. D. Hamrick	A. J. Holmes	Carlos Dickson	J. B. Sullivan	Indianapolis	7,087 00
1869	A. D. Hamrick	A. J. Holmes	Carlos Dickson	J. B. Sullivan	Indianapolis	7,517 00
1870	J. D. Williams	Joseph Poole	Carlos Dickson	J. S. Benson	Indianapolis	7,914 00
1871	J. D. Williams	Joseph Poole	Carlos Dickson	Jacob Mutz	Indianapolis	8,564 00
1872	John Sutherland	Alex. Herron	Carlos Dickson	H. W. Caldwell	Indianapolis	9,619 20
1873	John Sutherland	Alex. Herron	Carlos Dickson	H. W. Caldwell	Indianapolis	8,864 75
1874	John Sutherland	Alex. Herron	Carlos Dickson	E. J. Howland	Indianapolis	10,754 00
1875	William Crim	Alex. Herron	Carlos Dickson	E. J. Howland	Indianapolis	12,068 20
1876	Hezekiah Caldwell	Alex. Herron	Carlos Dickson	J. L. Hanna	Indianapolis	8,179 30
1877	Jacob Mutz	Alex. Herron	Carlos Dickson	J. W. Furnas	Indianapolis	6,337 95
1878	W. B. Seward	Alex. Herron	Carlos Dickson	R. M. Lockhart	Indianapolis	5,057 00
1879	Robert Mitchell	Alex. Herron	Carlos Dickson	R. M. Lockhart	Indianapolis	5,472 00
1880	W. H. Ragan	Alex. Herron	J. A. Wildman	Fielding Beeler	Indianapolis	6,553 00
1881	R. M. Lockhart	Alex. Herron	J. A. Wildman	Fielding Beeler	Indianapolis	6,855 50
1882	H. C. Meredith L. B. Custer	Alex. Herron	J. A. Wildman	Fielding Beeler	Indianapolis	8,096 00
1883	Robert Mitchell	Alex. Herron	J. A. Wildman	Fielding Beeler	Indianapolis	9,581 13
1884	Robert Mitchell	Alex. Herron	S. Johnson	Fielding Beeler	Indianapolis	10,414 30
1885	R. M. Lockhart	Alex. Herron	S. Johnson	Fielding Beeler	Indianapolis	9,000 50
1886	W. B. Seward	Alex. Herron	S. Johnson	H. B. Stout	Indianapolis	9,419 00
1887	W. B. Seward	Alex. Herron	S. Johnson	Chas E. Merrifield	Indianapolis	9,726 50
1888	J. N. Davidson	Alex. Herron	S. Johnson	R. M. Lockhart	Indianapolis	9,917 50
1889	J. N. Davidson	Alex. Herron	S. Johnson	C. E. Merrifield	Indianapolis	10,200 00
1890	W. A. Banks	Alex. Herron	S. Johnson	C. E. Merrifield	Indianapolis	13,040 50
1891	W. A. Banks	Leon T. Bagley	S. Johnson	C. E. Merrifield	Indianapolis	15,297 00

A TABLE SHOWING THE OFFICERS, PLACE AND PREMIUMS PAID OF EACH FAIR HELD BY THE STATE BOARD OF AGRICULTURE—Continued.

Year.	President.	Secretary.	Treasurer.	General Superintendent.	Place of Fair.	Premiums Paid.
1892	J. M. Boggs	Leon T. Bagley	S. Johnson	E. H. Peed	Indianapolis	$19,576 00
1893	V. K. Officer	Chas. F. Kennedy	Jas. A. Wildman	E. H. Peed	Indianapolis	18,407 50
1894	J. M. Sankey	Chas. F. Kennedy	E. J. Robison	E. H. Peed	Indianapolis	18,516 70
1895	J. M. Sankey	Chas. F. Kennedy	E. J. Robison	E. H. Peed	Indianapolis	17,561 98
1896	W. W. Hamilton	Chas. F. Kennedy	E. J. Robison	E. H. Peed	Indianapolis	14,817 17
1897	C. B. Harris	Chas. F. Kennedy	E. J. Robison	E. H. Peed	Indianapolis	19,296 83
1898	Charles Downing	Chas. F. Kennedy	E. J. Robison	John L. Thompson	Indianapolis	....

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* Henry C. Meredith died July 5, 1882, and the Vice-President, L. B. Custer, served the unexpired term.

A TABLE SHOWING THE OFFICERS, PLACE AND PREMIUMS PAID OF EACH FAIR HELD BY THE STATE BOARD OF AGRICULTURE.

Year.	President.	Secretary.	Treasurer.	General Superintendent.	Place of Fair.	Premiums Paid.
1852	Gov. Joseph A. Wright	John B. Dillon	Royal Mayhew	W. T. Dennis	Indianapolis	
1853	Gov. Joseph A. Wright	John B. Dillon	Royal Mayhew	J. J. Bingham	Lafayette	
1854	Gov. Joseph A. Wright	Wm. T. Dennis	Royal Mayhew	W. T. Dennis	Madison	
1855	Gen. Joseph Orr	John B. Dillon	S. A. Buell	Calvin Fletcher, Jr	Indianapolis	[illegible]
1856	Dr. A. C. Stevenson	Ignatius Brown	S. A. Buell	Calvin Fletcher, Jr	Indianapolis	[illegible]
1857	Dr. A. C. Stevenson	Ignatius Brown	S. A. Buell	Calvin Fletcher, Jr	Indianapolis	4,137 00
1858	Dr. A. C. Stevenson	John B. Dillon	Thomas H. Sharp	Calvin Fletcher, Jr	Indianapolis	
1859	George D. Wagner	John B. Dillon	Thomas H. Sharp	James L. Bradley	New Albany	[illegible]
1860	George D. Wagner	Wm. T. Dennis	Thomas H. Sharp	James L. Bradley	Indianapolis	[illegible]
1861	D. P. Holloway	Wm. T. Dennis	I. A. Fletcher		No Fair	
1862	James D. Williams	W. H. Loomis	I. A. Fletcher	J. A. Grosvenor	Indianapolis	2,904 00
1863	A. D. Hamrick	W. H. Loomis	I. A. Fletcher	J. A. Grosvenor	Indianapolis	
1864	Stearns Fisher	W. H. Loomis	Francis King	W. H. Loomis	Indianapolis	[illegible]
1865	Stearns Fisher	W. H. Loomis	Carlos Dickson	J. A. Grosvenor	Fort Wayne	[illegible]
1866	Stearns Fisher	W. H. Loomis	Carlos Dickson	J. A. Grosvenor	Indianapolis	
1867	A. D. Hamrick	A. J. Holmes	Carlos Dickson	J. B. Sullivan	Terre Haute	[illegible]
1868	A. D. Hamrick	A. J. Holmes	Carlos Dickson	J. B. Sullivan	Indianapolis	[illegible]
1869	A. D. Hamrick	A. J. Holmes	Carlos Dickson	J. B. Sullivan	Indianapolis	[illegible]
1870	J. D. Williams	Joseph Poole	Carlos Dickson	J. B. Benson	Indianapolis	[illegible]
1871	J. D. Williams	Joseph Poole	Carlos Dickson	Jacob Mutz	Indianapolis	[illegible]
1872	John Sutherland	Alex. Herron	Carlos Dickson	H. W. Caldwell	Indianapolis	[illegible]
1873	John Sutherland	Alex. Herron	Carlos Dickson	H. W. Caldwell	Indianapolis	[illegible]
1874	John Sutherland	Alex. Herron	Carlos Dickson	E. J. Howland	Indianapolis	[illegible]
1875	William Crim	Alex. Herron	Carlos Dickson	E. J. Howland	Indianapolis	[illegible]
1876	Hezekiah Caldwell	Alex. Herron	Carlos Dickson	J. L. Hanna	Indianapolis	[illegible]
1877	Jacob Mutz	Alex. Herron	Carlos Dickson	J. W. Furnas	Indianapolis	[illegible]
1878	W. B. Seward	Alex. Herron	Carlos Dickson	R. M. Lockhart	Indianapolis	6,057 00
1879	Robert Mitchell	Alex. Herron	J. A. Wildman	R. M. Lockhart	Indianapolis	6,478 00
1880	W. H. Ragan	Alex. Herron	J. A. Wildman	Fielding Beeler	Indianapolis	6,553 00
1881	R. M. Lockhart } H. C. Meredith }	Alex. Herron	J. A. Wildman	Fielding Beeler	Indianapolis	6,866 50
		Alex. Herron	J. A. Wildman	Fielding Beeler	Indianapolis	8,096 00
		Alex. Herron	S. Johnson	Fielding Beeler	Indianapolis	9,681 18
				Fielding Beeler	Indianapolis	10,414 80
				Fielding Beeler	Indianapolis	9,000 50
				H. B. Stout	Indianapolis	9,419 00
				E. Merrifield	Indianapolis	9,728 50
					Indianapolis	9,917 50
					Indianapolis	10,300 00
						13,040 50
						15,297 00

[illegible] THE STATE BOARD

[illegible]	[illegible]	[illegible]	[illegible]	GENERAL SUPERINTENDENT.	PLACE OF FAIR.	PREMIUMS PAID.
[illegible]	[illegible]	Leon T. Bagley	R. Johnson	[illegible]	Indianapolis	$19,716 00
[illegible]	[illegible]	Chas. F. Kennedy	[illegible]	[illegible]	Indianapolis	18,407 50
[illegible]	[illegible] Hamilton	Chas. F. Kennedy	[illegible]	[illegible]	Indianapolis	18,216 70
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Indianapolis	17,461 95
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Indianapolis	14,817 17
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Indianapolis	19,296 83

OFFICERS AND [illegible]

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State Industrial Associations.

OFFICERS FOR THE YEAR 1898.

The Indiana State Board of Agriculture—President, Hon. Charles Downing, Greenfield, Hancock County; Secretary, Charles F. Kennedy, Indianapolis.

Indiana Horticultural Association—President, C. M. Hobbs, Bridgeport; Secretary, James Troop, Lafayette.

Indiana Shorthorn Breeders' Association —President, James D. Williams, Pond Creek Mills, Knox County; Secretary and Treasurer, C. E. Thompson, Irvington, Marion County.

Indiana Dairymen's Association —President, S. B. Woods, Lottaville, Lake County; Secretary and Treasurer, C. S. Plumb, Lafayette, Tippecanoe County.

Indiana Wool Growers' Association—President, J. B. Hearkless, Rush County; Secretary, F. W. Robe, Greencastle.

Indiana Swine Breeders' Association—President, E. M. C. Hobbs, Salem; Secretary, Allen Beeler, Liberty.

Indiana Poultry Breeders' Association—President, Nelson Hyde, Indianapolis; Secretary, Thos. W. Pottage, Indianapolis.

Indiana Farmers' Mutual Insurance Union—President, Aaron Jones, South Bend, St. Joseph County; Secretary, Joshua Strange, Marion, Grant County.

Indiana Jersey Cattle Club—President, J. H. Matlock, Brownstown; Secretary, W. S. Budd, Sixth and Canal Streets, Indianapolis.

Farmers' Institutes —Director, Prof. W. C. Latta, Purdue University, Lafayette.

Experiment Station —Director, Prof. C. S. Plumb, Purdue University, Lafayette.

THE

Indiana State Board of Agriculture.

CONSTITUTION

AS REVISED AND ADOPTED AT THE JANUARY MEETING OF THE BOARD, 1891.

ARTICLE 1. The name and style of this society shall be "The Indiana State Board of Agriculture," its objects, to promote and improve the condition of agriculture, horticulture, and the mechanic, manufacturing and household arts.

ART. 2. There shall be held in the city of Indianapolis, at such time as may be prescribed by law, an annual meeting of the State Board of Agriculture, together with presidents, or other delegates duly authorized, from each county, or such other agricultural society as may be authorized by law to send delegates, who shall, for the time being, be ex-officio members of the State Board of Agriculture, for the purpose of deliberation and consultation as to the wants, prospects and condition of the agricultural interests throughout the State; and at such annual meetings the several reports from county societies shall be delivered to the President of the State Board of Agriculture; and the said President and delegates shall, at this meeting, elect suitable persons to fill all vacancies in this Board: *Provided, however*, That said election shall not affect the members of the Board present, whose terms shall not be considered to expire until the last day of the session.

ART. 3. The State Board-elect shall meet immediately after the adjournment of the State Board, for the purpose of organization and for the transaction of such other business as the wants and interests of the society may require; and hold such other meetings, from time to time, for making out premium lists, preparing for State Fairs, and all other business necessary to the promotion of the objects of the society.

ART. 4. The State Board-elect shall consist of sixteen members, chosen from the following districts:

1st District—Posey, Vanderburgh, Gibson, Warrick and Spencer counties.
2d District—Knox, Daviess, Martin, Pike, Dubois, Crawford and Perry counties.
3d District—Harrison, Washington, Orange, Floyd, Clark and Scott counties.
4th District—Jackson, Lawrence, Brown, Monroe, Greene, Owen, Johnson and Sullivan counties.
5th District—Jefferson, Switzerland, Ohio, Dearborn, Franklin, Ripley and Jennings counties.
6th District—Bartholomew, Decatur, Rush, Fayette, Union and Wayne counties.
7th District—Madison, Hancock, Hamilton, Henry and Shelby counties.
8th District—Marion County.
9th District—Clay, Vigo, Parke, Vermillion and Fountain counties.
10th District—Putnam, Morgan, Hendricks, Montgomery and Boone counties.
11th District—Delaware, Randolph, Jay, Adams, Wells, Huntington and Blackford counties.
12th District—Carroll, White, Benton, Newton, Tippecanoe, Warren, Jasper and Pulaski counties.
13th District—Clinton, Tipton, Howard, Grant, Wabash and Whitley counties.
14th District—Elkhart, Kosciusko, Fulton, Cass and Miami counties.
15th District—St. Joseph, Marshall, Starke, Laporte, Porter and Lake counties.
16th District—Allen, Dekalb, Steuben, Lagrange and Noble counties.

Chosen for two years, one-half of whose terms expire every year, to wit: Those representing the first, second, third, fourth, seventh, fourteenth, fifteenth and sixteenth districts expire at the annual meeting of 1860, and those representing the fifth, sixth, eighth, ninth, tenth, eleventh, twelfth and thirteenth districts expire at the annual meeting to be held in January, 1861. To be chosen by ballot.

ART. 5. It shall be the duty of the President to preside at all meetings, conduct the business in an orderly and parliamentary manner, and officially sign all vouchers and drafts upon the Treasurer (except for premiums), and all other instruments requiring the same, and call special meetings in cases of emergency.

ART. 6. The State Board-elect shall, at the annual meeting after the adjournment of the delegate meeting, proceed to elect one of their number President, who shall hold his office for a term of one year, and until his successor is elected and qualified; and one of their number for Vice-President, whose term shall be the same as President, who shall act, and for the time being have all the power, as President, whenever the President is absent from any regular meeting. They shall also elect some suitable person as Secretary and some suitable person as Treasurer, and a General Superintendent, who shall hold their offices each for one year, unless removed for incompetency or neglect of duty. They shall also elect four of their number who shall, with the President, constitute an Executive Committee, who shall have power to act in cases of emergency, where loss would result by waiting till a regular meeting of the Board, but shall have no power whatever during a meeting of the Board.

ART. 7. It shall be the duty of the Treasurer to safely keep the funds belonging to the society, pay out the same on orders or drafts drawn by the Secretary, and report annually to the State Board, and as much oftener as he may be called upon by the Board, and shall give bond for the faithful performance of his duties.

ART. 8. It shall be the duty of the General Superintendent to take care of and carefully keep all property belonging to the society, have the care and control of the Fair Grounds during the recess; have the supervision and oversight of such improvements or additions as may be directed by the State Board, and, under their direction, procure materials, contract for labor, and shall be, during the continuance of a Fair, the Chief Marshal and head of the police. The members of the Board shall employ all the necessary police and gatekeepers.

ART. 9. The Secretary shall keep a true record of the proceedings. He shall conduct all correspondence on behalf of the society, except when otherwise directed by the President. He shall, by himself and assistants by him appointed, arrange the details of the entries, tickets, and enroll the names of committees and judges of the State Fair, receive and record the various reports of the awarding committees, fill out and deliver all diplomas and certificates. It shall be the duty of the Secretary to condense the County Agricultural reports for each year into one volume and superintend the publishing of the same. He shall audit and file all accounts against the Board; draw orders in favor of the proper persons on the Treasurer for the amount; but orders shall not be drawn payable to order or bearer, but to the name of the party alone, or his agent. He shall make an annual report, showing amount of all orders upon the treasury, and shall perform such other duties as the best interests of the society may demand; but he is at all times subject to the direction and control of the State Board.

ART. 10. At the annual meeting of the Board the salaries of the Treasurer, Secretary and Superintendent shall be fixed for the ensuing year: Provided, That said Board may, in their discretion, at any meeting of said Board, make said officers an additional allowance for extra services.

ART. 11. That no compensation shall be allowed to delegates attending the annual meeting of the State Board; nor shall the members of the State Board-elect be paid any sum of money, as compensation or otherwise, except by order of the Board-elect.

ART. 12. The State Board may adjourn from time to time, or they may be called together by the Secretary, by order of the President, by a written notice to each member, enclosed by mail, and a notice of such meeting published in two or more newspapers of general circulation, in the city of Indianapolis; and all meetings so held by adjournment, or calls, shall be deemed regular and legal.

ART. 13. Any alteration or amendment to this Constitution may be made at the annual meeting of the State Board, two-thirds of all the members voting for such amendment.

ART. 14. The following standing committees shall be appointed by the President, to whom all matters of business coming up for reference under their particular heads, shall be referred, unless otherwise specially directed by the Board:

1. Finance and Claims.
2. Rules and Regulations.
3. Fair Grounds.
4. Unfinished Business.
5. Geological Survey—Executive Committee, ex-officio.
6. Premium List.

AMENDMENTS TO THE CONSTITUTION.

At the May meeting in 1851, certain rules, embracing ten sections, for the government of county agricultural societies, were adopted by the Board of Agriculture, as required in Section 1 of the Statute laws enacted by the Legislature of Indiana for the "Encouragement of Agriculture," approved February 17, 1852.

At the February meeting of 1868 the rules were found inexpedient and were repealed, and the following resolutions, submitted by the Committee on Rules and Regulations, were adopted:

Resolved, That all county and district societies shall be organized and governed by the laws of the State of Indiana in regard to agricultural societies, and especially under the act passed by the Legislature and approved February 17, 1852.

Resolved, That all societies so organized will be entitled to send delegates to this Board (State Board of Agriculture) at its annual meetings, and will be received and acknowledged upon the presentation of their reports and credentials, and compliance with the laws as legally organised societies.

THE

Indiana State Board of Agriculture.

A RESUME OF THE WORK FOR 1897.

ORGANIZATION OF THE BOARD.

WEDNESDAY, JANUARY 6, 1897.

Immediately following adjournment of Board of 1896, the members holding over and the members elected in 1897 proceeded to the election of officers for the ensuing year, with Hon. Aaron Jones, of St. Joseph County, in the Chair, and Charles F. Kennedy Acting Secretary.

The motion of Mr. Niblack, that the Board proceed to the election of a President, prevailed, and the Chairman called for nominations for President.

James E. McDonald placed in nomination Charles B. Harris, of Elkhart County.

Mr. Niblack: Inasmuch as there is but one candidate for President, I move you that the Secretary be instructed to cast sixteen votes for Mr. Harris for President of the Board. Prevailed.

The Secretary having cast sixteen votes for Charles B. Harris, the Chairman declared him duly elected as President of the Board for the year 1897.

The Chair declared that the next proceeding would be the election of Vice-President, and called for nominations.

Mr. Davis nominated Hon. Warden W. Stevens, of Washington County, and when it appeared that there were no other nominations, moved that the Secretary be instructed to cast sixteen votes for Mr. Stevens for Vice-President, which motion prevailed.

The Secretary cast the sixteen votes for Mr. Stevens, and the Chairman declared him duly elected Vice-President of the Board for 1897.

The Chair called for nominations for Secretary and the name of Charles F. Kennedy was the only name presented. Mr. Claypool moved that the Chairman cast sixteen votes for Charles F. Kennedy for Secretary for 1897, which motion prevailed.

The Chair cast the vote as provided by the motion and declared Mr. Kennedy duly elected Secretary of the Board for the year 1897.

The Chair announced that the next thing in order would be the election of Treasurer of the Board and called for nominations.

The name of E. J. Robison being the only name placed before the Board, Mr. Davis moved that the Secretary cast sixteen votes for E. J. Robison for Treasurer of the Board, which motion prevailed.

The Secretary having cast the vote of the Board as directed, the Chairman declared Mr. Robison duly elected Treasurer of the Board for 1897.

The motion of Mr. McDonald, that the President be clothed with the power to name the members of the Executive Committee, prevailed.

The motion of Mr. Claypool, that the President announce the names of the members of the Executive Committee and the Department Superintendents, prevailed.

In accord with the above motion, the President announced the following appointments:

EXECUTIVE COMMITTEE.

Aaron Jones.	Mason J. Niblack.
Charles Downing.	John L. Thompson.

DEPARTMENT SUPERINTENDENTS.

Admissions	AARON JONES.
Privileges	CHARLES DOWNING.
Speed	M. S. CLAYPOOL.
Draft and Coach Horses	J. W. LAGRANGE.
Light Harness Horses	JOHN C. HAINES.
Beef Cattle	CLAUDE MATTHEWS.
Dairy Cattle and Dairy Products	H. B. HOWLAND.
Sheep	JOHN L. THOMPSON.
Swine	H. L. NOWLIN.
Poultry	KNODE PORTER.
Arts	JAMES E. McDONALD.
Horticulture	MORTIMER LEVERING.
Agriculture	JOHN L. DAVIS.
Mechanics	W. W. STEVENS.
Grand Stand	MASON J. NIBLACK.

The motion of Mr. Downing, that the Board proceed to the election of General Superintendent of Grounds, prevailed, and E. H. Peed, of New Castle, was unanimously selected.

The motion of Mr. Niblack, that the Board recommend to the Governor that James M. Sankey be appointed to succeed himself as member of the Indiana Live Stock Sanitary Commission, prevailed, and the Secretary was authorized to notify the Governor of the action of the Board.

The motion of Mr. Claypool, that the Secretary invite the Commercial Club and the Board of Trade to appoint committees to cooperate with the State Board of Agriculture, prevailed.

After referring all unfinished business of the Board to the Executive Committee, the Board adjourned.

STATE BOARD MEETING.

MARCH 10, 1897.

Pursuant to the call of the President, the Indiana State Board of Agriculture met in the parlors of the Grand Hotel, at eight o'clock p. m., C. B. Harris presiding, and all members present.

The President announced the following committees, and directed them to report to the Board at their meeting March 11th.

Committee on Resolutions on the death of Hon. James M. Sankey, member of the Board from Vigo County: Mason J. Niblack, Mortimer Levering and W. W. Stevens.

Committee on Revision of Rules of Premium List: M. S. Claypool, H. B. Howland and H. S. Nowlin.

Committee on Salaries for 1897: J. W. Lagrange, John L. Davis and J. C. Haines.

Adjourned to meet at rooms in State House, March 11th.

Pursuant to adjournment on March 10th, the Board assembled in Room 12, State House. All members present, and C. B. Harris presiding.

The President announced that the Board would proceed to elect a member in accordance with the published meeting called to fill the vacancy on the Board occasioned by the death of Hon. James M. Sankey.

The motion of Mr. Howland, that the Board proceed to ballot for member without nomination, prevailed.

The Chair appointed as teller J. W. Lagrange, and the ballot resulted as follows:

First Ballot—Mr. G. A. Beauchamp, 3 votes; W. H. Kidder, 6 votes; Claude Matthews, 5 votes.

Second Ballot—Beauchamp, 4 votes; Kidder, 6 votes; Matthews, 4 votes.

Third Ballot—Beauchamp, 3 votes; Kidder, 5 votes; Matthews, 6 votes.

Fourth Ballot—Beauchamp, 3 votes; Kidder, 6 votes; Matthews, 5 votes.

Fifth Ballot—Kidder, 6 votes; Matthews, 8 votes.

The President declared Hon. Claude Matthews, of Vermillion County, duly elected to fill the unexpired term of member from the Ninth District.

The motion of Mr. Downing, that the President direct the Superintendent to plant a plat of ground in potatoes and another plat in corn for the purpose of demonstrating the working of cultivating and harvesting machinery, prevailed.

The Secretary announced as candidates for membership of the Indiana Live Stock Commission the following: Levi H. Aikman, C. H. Morgan, John L. Davis, V. K. Officer and Clay Hannah.

The President announced that the Board would proceed to select for recommendation to the Governor a member of the Indiana Live Stock Sanitary Commission, and the ballots that followed resulted:

First Ballot—Davis, 3 votes; Morgan, 4 votes; Aikman, 3 votes; Officer, 5 votes.

Second Ballot—Davis, 5 votes; Morgan, 4 votes; Aikman, 2 votes; Officer, 4 votes.

Third Ballot—Davis, 5 votes; Officer, 10 votes.

The President declared Mr. Officer elected, and directed the Chair to certify his election to the Governor.

The motion of Mr. Lagrange, that the date of the next State Fair be fixed September 13 to 18, 1897, prevailed.

REPORT OF COMMITTEE ON SALARIES.

Your committee to whom was referred the question of salaries of members, officers, judges and assistants, begs leave to report as follows:

Members: Five dollars per day and five cents per mile for each mile traveled.

General Superintendent: Five dollars per day and five cents per mile for each mile traveled.

Secretary: Eighteen hundred dollars per annum and the net proceeds from advertising in the premium list, the Secretary to provide the premium list without cost to the Board and to pay for help needed in the conduct of the affairs of his office.

Treasurer: Five hundred and fifty dollars per annum, the Treasurer to provide and pay for all ticket sellers and other help necessary to conduct the affairs of his office.

Janitor: Three hundred and fifty dollars per annum.

Judges: Five dollars per day and actual mileage.

Assistants: Three dollars per day and actual mileage.

Respectfully submitted,

J. W. LAGRANGE,
JOHN L. DAVIS,
JOHN C. HAINES,
Committee.

The motion of Mr. Levering, that the report of the committee be adopted and spread of record, prevailed.

REPORT OF COMMITTEE ON DEATH OF HON. JAMES M. SANKEY.

Your committee appointed to draft resolutions on the death of the Hon. James M. Sankey begs leave to report as follows:

Whereas, In the dispensation of Divine Providence it hath pleased the Almighty Father of us all to take from our midst Brother James M. Sankey; be it therefore

Resolved, That in the death of Brother Sankey the Indiana State Board of Agriculture has lost an esteemed and valuable member—one who had been honored by the office of President and who presided as such chief officer in the most agreeable and satisfactory manner. As a member of the Board he gave years of devotion to its best interests, and his good judgment, wise counsel and unremitting zeal will be an irreparable loss to us as a Board and to the agricultural interests in general throughout the State. Each of his associate members lament the loss of a cordial, steadfast friend and a sympathizing companion, ready at all times to share our fortunes and reverses.

As a Board we extend to his family the deepest and most profound sympathy and share with them their grief, commending them to their Heavenly Father, who alone can give solace and comfort to the widow and fatherless.

MASON J. NIBLACK,
MORTIMER LEVERING,
W. W. STEVENS,
Committee.

The motion of Mr. Lagrange, that the Board indorse the report of the committee, prevailed unanimously.

The motion of Mr. Claypool, that all unfinished business be referred to the Executive Committee with power to act, prevailed.

MEETING OF EXECUTIVE COMMITTEE.

MARCH 11, 1897.

The motion of Mr. Downing, that the matter of painting the buildings be referred to a committee consisting of Messrs. Harris and Thompson, and that they be given power to have the buildings painted, prevailed.

MEETING OF EXECUTIVE COMMITTEE.

APRIL 6, 1897.

The motion of Mr. Niblack, that the proposition of the ladies of Roberts Park M. E. Church to furnish meals for the Board and their guests in the Administration Building during the week of the Fair, at the rate of 50 cents per meal, be accepted, prevailed.

The motion of Mr. Downing, that the President and Secretary be constituted a committee to employ the Indianapolis Military Band to furnish twenty men for Tuesday, Wednesday, Thursday and Friday of the Fair, prevailed.

The motion of Mr. Jones, that the proposition of H. B. Howland to care for the race track and collect rents for use of stalls and track, the board to be charged for such services at the rate of $2.50 per day for team and hand and 5 per cent. for money collected as rent, be accepted, prevailed.

The motion of Mr. Niblack, that the committee appoint Hon. W. B. Holton an advisory member of the State Board of Agriculture, representing the city of Indianapolis, prevailed.

Motion of Jones, that the matter of arranging a program for Indianapolis Day be referred to the committees representing the Board of Trade, the Commercial Club and the press, prevailed.

MEETING OF EXECUTIVE COMMITTEE.

MAY 11, 1897.

Contract with H. B. Howland for maintenance of track approved and ordered spread of record.

The motion of Thompson, that the Secretary be instructed to visit larger towns adjacent to the city of Indianapolis and arrange details for advertising the Fair, prevailed.

MEETING OF EXECUTIVE COMMITTEE.

JUNE 10, 1897.

Motion of Mr. Niblack, that the sale of special admissions for the Fair of 1897 be referred to the Superdintendent of Admissions with full power to act, prevailed.

The motion of Mr. Jones, that the matter of executing a lease to the Citizens' Street Railway granting them the right to construct and maintain tracks within the State Fair Grounds be referred to a committee consisting of Downing and Harris, and the committee have power to act for the full Board, prevailed.

Motion of Mr. Niblack, that Mr. Harris be given power to select and purchase for the Board a suitable wire fence to inclose the tracks of the Citizens' Street Railway, prevailed.

MEETING OF STATE BOARD IN ROOMS OF GRAND HOTEL.

SEPTEMBER 11, 1897.

The motion of Mr. Jones, that the service in the dining room at the Administration Building be limited to the members, officers and lady assistants, prevailed.

The motion of Mr. McDonald, that the President appoint a committee of three to determine the question of selling reserved seats in the Grand Stand on the day of the race between Joe Patchen and Star Pointer, prevailed. Committee: Messrs. Niblack, Matthews and Claypool.

REPORT OF ABOVE COMMITTEE.

Your committee to whom was referred the question of selling reserved seats in the grand stand begs leave to recommend that 1,200 seats be reserved in the center of the grand stand and that tickets be placed on sale at some place in the city, and that said seats be sold at $1.00 each.

On motion of Mr. Howland, the report of the committee was approved.

MEETING OF STATE BOARD IN THE ADMINISTRATION BUILDING.

SEPTEMBER 17, 1897.

An appeal from the decision of the Superintendent of the Horticultural Department was heard and, on motion of Mr. Claypool, was referred to a committee with instructions to conduct an investigation and determine the rights of all parties and report their conclusions to the Secretary. Committee: McDonald, Downing and Levering.

On motion of Mr. Matthews, all premium horses and cattle were ordered to parade in the track in front of Grand Stand at 12 m.

The motion of Mr. McDonald, that the Fair be continued over Saturday, and that the speed program be completed on this day, admission to grounds to be reduced to 25 cents, prevailed.

MEETING OF EXECUTIVE COMMITTEE.

NOVEMBER 5, 1897.

The motion of Mr. Jones, that the Secretary be instructed to receive and receipt for $1,490, the same being accepted in full settlement for loss by wind storm on swine barns during the week of the Fair, 1897, prevailed.

The President announced the following Auditing Committee, with instructions to report December 29, and audit the books of the Secretary and Treasurer, and report to the annual meeting in January, 1898:

DELEGATE STATE BOARD ANNUAL MEETING.

JANUARY 4, 1898.

As provided by the Charter of the Indiana State Board of Agriculture, the members of the Board, together with the delegates from the various fair associations of the State, convened in annual session in Room 12 of the Capitol Building, city of Indianapolis, Vice-President Stevens presiding and all members of the Board, except President Harris, present.

The roll-call of delegates proceeded, and twenty-seven delegates responded to the call.

ADDRESS OF WELCOME.

Hon. Thomas Taggart, Mayor of the city of Indianapolis, was introduced, and addressed the meeting as follows:

Mr. President and Gentlemen—Some time ago I had a letter from your Secretary, Mr. Kennedy, inviting me to be present at this meeting and to extend to the Indiana associations a word of welcome. In that letter he said he was willing to wager, in the ratio of 16 to 1, that I would not talk over five minutes.

I wish to say to you this morning that I am glad to see gathered here the associations representing the different industrial associations of Indiana. Indiana, my friends, is a State not only rich in natural resources, but it is rich in a class of intelligent gentlemen who have advanced the different interests and industries to a very high standard. You have met here for the purpose, I understand, of selecting members for your different associations, talking over the interests that pertain to the organizations which you represent, and to-morrow you elect officers for the State Board of Agriculture. The State Board of Agriculture, in my judgment, has done as much to bring Indiana prominent as an agricultural State as any State in the Union; indeed, I think it stands first. Now, without taking your time, I wish to extend to you, one and all, a hearty and cordial welcome; and I assure you that the citizens of Indiana take an interest in the State Board of Agriculture and in the State Fair, and while they turned out in large numbers at the last fair, I believe I am safe in saying that with the same kind of a fair that you gave last, the numbers will be increased this year.

At the close of the address of welcome, the Secretary requested that all delegates proceed to file their credentials, and an intermission of ten minutes was taken that this work might proceed.

PRESIDENT'S ADDRESS.

President Harris, not being present, his address was read by Hon. Mortimer Levering, of Tippecanoe County, and is in words and figures as follows:

To the Members of the Indiana State and Delegate Boards of Agriculture:

Gentlemen—In conformity to the laws of our State, you meet here to-day for the purpose of deliberation and consultation concerning the wants, prospects and conditions of the agricultural interests of the State; and for the purpose of electing suitable persons to fill eight vacancies on the State Board. May it be said of this Board that its actions at this meeting were wise and that the same proved beneficial to the interests which you represent.

It is with great pleasure that we can and do congratulate the farmers of Indiana on the bounteous crops which their farms produced during the past year. We congratulate them on the increased price of their products. The crops and the prices received have to a certainty set the wheels of business revolving, as is witnessed by the fact that the merchant, the manufacturer and the laboring man are, with willing hands, happy faces, and happy families, busy in their different avocations. For all of this we are indebted to an ever-present and all kind Providence, and to Him we are truly and sincerely thankful.

The possibilities which Indiana can accomplish with her grain-producing farms, her extensive quarries and coal fields, her immense manufacturing interests, her horticultural lands, and her herds and flocks is well known throughout this country. There is, in my opinion, a possibility of as great a success in the business of dairying as there is, or has been, in any of the interests named. I believe there is in store a great future for the farmers of Indiana in the dairy cow. We are in close proximity to all the best markets of this country. All the trunk lines of railroads traverse the State. The express companies and freight lines can, within a few hours, deliver our products in the market. Indiana possesses the men and women with whom to develop the great, growing and profitable industry. Will they grasp the opportunity? I believe they will.

I believe in educating the farmer's boy for the business of farming. There is no reason why this should not be done. The young man who desires to make himself a lawyer begins early in life to fit himself to give legal advice, and to try cases in the courts. The boy who desires to become a successful physician also commences early in life to fit himself to dispense pills and powders. Is the business of farming any less important than the professions just named? I think not. I believe that an agricultural education is absolutely essential to prosperous and progressive farming. Agricultural schools have been started in every State of our Union for the purpose of enabling farmers' sons to obtain an education which will fit them to be successful farmers. Among the best is our own "Purdue," at Lafayette. To that school I commend the farmers, and the farmers' sons and daughters of our State, and I earnestly hope they will take advantage of the offers made by that well-equipped university. It was founded for their benefit. Large appropriations have been made by the Nation and the State for its support, and the farmer should see that his children have the benefit from the University that the law intends that they shall receive.

I firmly believe that the Farmers' Institutes have been of immense and lasting value to the people of Indiana, and I hope and trust that this Board will in all possible ways encourage the management of the Institutes in their efforts to teach progressive farming, and in their work of awakening the farmer to the duty that he owes the State.

I congratulate this Board on having held the most successful fair, in all respects, ever held in this State, and in this connection I wish to acknowledge the great services rendered by the Indianapolis Board of Trade, the Commercial Club of Indianapolis, the Press Association of Indianapolis, and the Indianapolis Traffic Association. Each of these organizations named a committee to co-operate with the State Board in making the State Fair of 1897 a decided success. Well were their efforts rewarded, and to those organizations this Board is under deep and lasting obligations. With the co-operation of the citizens of Indianapolis, successful State fairs can be held. Without their co-operation the fairs are sure to be a failure. We sincerely thank the citizens of Indianapolis for their assistance.

It is a cause for congratulation that the Board is out of debt. For a detailed report of the receipts and expenditures for the last year I call the attention of the Board to the reports of the Secretary and the Treasurer.

The Indiana State Board of Agriculture is an organization whose responsibility to the people of the State is very great; therefore, gentlemen, I suggest that this Board perform in more ways than that of holding an Annual Fair its duty to the class that it represents. We owe our existence as a Board to the farmer, and we should certainly use our office to the betterment of his interests. I think that the Legislature should be asked to enlarge the duties of the Board.

My observation and experience have plainly shown me that Fair managers, in order to be successful, year after year, in holding Fairs, must see that the attractions are shown as advertised. Any deviation from the program is cause for the public losing confidence in the Fair. It is necessary for the Board to see to it that the programs are, in the future, filled to the very letter.

I suggest that the Board erect a large Mechanical Building, between the Administration Building and the Grand Stand, leaving space between the building and the fence next to the track sufficient for vehicles. The floor should be made of Portland cement, and a charge can be made for space, which will be willingly paid by the exhibitor.

I suggest that the Board set aside space for mechanical exhibits and privileges in order to prevent interference between the suprintendents of these departments. I suggest that this be done by the Board at the February or March meeting next.

The Board has thoroughly washed the Fair Grounds of the pollution they received by fake shows and other disreputable concerns and gambling devices. It was a great pleasure to the people of our State to notice that at the last Fair they and their children were not contaminated by immoral exhibitions and games of chance. I earnestly hope that the Board in the future will keep itself clean from all such pollution.

I suggest that the space under the Grand Stand be ceiled and a floor laid of brick or Portland cement, and that there be erected stalls of sufficient and different sizes for privileges. It is my opinion that quite a revenue can be derived from such stalls.

A half-mile track can be built around the speed barns for about $100, on which the horses in the speed department can be judged. Such a track will cost nothing to keep up and will save working the mile track until September 1 of each year. I suggest that one be built as early as possible in the spring of this year.

I suggest that the Board at once buy the land at the Fair Grounds which it has leased; that the money be borrowed, and the debt funded into a low rate of interest on long time. By doing so, it is my opinion that several hundred dollars' interest money can be saved annually to the Board.

I suggest that on the assembling of the next Legislature this Board should surrender to the State its rights as a private corporation with perpetual succession; that an act be drawn amending the act under which this Board now exists, so as to allow a membership in the Board to be of four years; and that the membership be of sixteen members; and that the members must be chosen from the district in which they reside; that the State as now districted for agricultural purposes be approved, and that the Board be given the right to redistrict the State from time to time as it may deem wise; also that the members of the Board be elected in the manner now provided by law; that the annual meetings for consultation and for the election of members to fill vacancies be held as now, and that four vacancies should occur each year. No part of the act should affect the term of service of any member of the Board in office at the time of the passage of the act, or at the time of its taking effect. If this suggestion should be adopted by the Board and accepted by the Legislature, then the Board does become in fact an institution of the State, and in all respects as much entitled to the protection and patronage of the people of the State as is any other institution within its borders. I request your consideration of this important matter. I also suggest that the President of the Board be elected to hold his office for a term of two years.

I suggest that the rules be amended so as to read that the General Superintendent must be a member of the Board. I also recommend that the President alone be authorized to purchase all supplies for the use of the Board; that he issue in the name of the Board all complimentary tickets used at the Fair, and that he be required to take an active part in the management of the affairs of the Board.

Gentlemen, in severing my connection with the Board, by limitation of my term of office, I wish to thank every member of the Board, and every person who has been a member of the Board for the uniform kindness and courtesy which has at all times been extended to me. I shall take with me the feeling that I have your hearty good will and God speed.

To each of you, individually, I wish abundant success in all your undertakings, and to the Board—may it live long and prosper, and be, in the future, as it has been in the past, of great benefit to the people of our commonwealth.

CHAS. B. HARRIS,
President.

The motion of Mr. Claypool, that the report be submitted to a committee of three, and that they make such reeommendations as may be deemed necessary on the report, carried.

Committee: James A. McDonald, Charles Downing, Claude Matthews, Mortimer Levering.

Committee on Credentials: M. S. Claypool, Muncie; Knode Porter, Hagerstown; F. McCartney, Angola.

ADDRESS OF GOV. JAMES A. MOUNT.

It affords me pleasure to greet you at your annual session. The statute, among other things, declares that this meeting shall be "for the purpose of deliberating and consulting as to the wants, prospects and condition of the agricultural interests throughout the State."

A few evenings since I heard a discussion among distinguished gentlemen of this city. It was the consensus of opinion that the most discouraging outlook for agriculture was found in the fact that so many young men were leaving the farm. Statistics and observation strongly tend to show that the urban population is rapidly increasing, while that of the rural districts increases at a far less rate. The casual observer might conclude that this is to the advantage of the farmer, as the tendency is to the decrease of producers and the increase of consumers. The careful student of economics, however, wants to understand the reason why there seems to be so little attraction in country life. To the consideration of this important question, gentlemen of the State Board of Agriculture, may I not claim your indulgence for a few moments?

Young men are full of hope, buoyant with expectations. They desire to enter the field that offers the broadest opportunities, that promises the highest success. Farmers, as a rule, are inclined to talk farming down, instead of exalting its possibilities. One of the gentlemen above referred to said that some aggressive efforts are needed to attract and add interest to farm life. He said: "The tendency of our educational system is away from the farm. The enjoyment of the beauties of farm life, the study of nature, the possibilities of the farmer being able to utilize the forces of nature's great laboratory and make them subservient to his will, do not occur to the farmer as one of his great privileges."

The Superintendent of Public Instruction informs me that the total amount annually expended in the cause of education in Indiana would not fall short of $10,000,000. In the Constitution of our State, Article VIII, Section 1, you will find the following:

"It shall be the duty of the General Assembly to encourage by all suitable means, moral, intellectual, scientific and agricultural improvement."

The moral, intellectual and scientific provisions are not lacking, but the agricultural instruction has been too long neglected. Thousands of dollars are annually expended in research among Greek and Latin roots, in learning how to translate—and comparatively nothing is expended in telling how to translate, through plant roots, the elements of soil fertility into abundant harvests and delicious fruits, thus supplying our needs and blessing the land. Do not understand me as opposing higher education. I am in favor of the broadest kind of education, but I want farmers educated in the science of agriculture as well.

There is practically no instruction as to how crops grow, the elements of plant food they require, how to conserve and how to restore these elements to the soil. These bedrock principles of successful agriculture are but little understood. There is little or nothing in the text-books of our schools to interest children in nature study, and yet there is much in plant life that would prove both interesting and profitable. Upon the importance of introducing into our curriculums of study themes tending to make farm life more attractive and farming more remunerative, President Smart, of Purdue University, writes me, under date of December 28, as follows: "I believe that a great deal of the education of our children in the country, in school and out, has a tendency to make them dissatisfied with their surroundings, and unduly foster in their minds a desire to seek their fortunes in the large commercial centers.

"Much is being done to improve the surroundings of children in the country, but many more things ought to receive attention. Among other things, I believe that some instruction in agriculture should be given in the schools of the rural districts. I should be in favor of introducing a text-book on the subject, if one could be found, but in lieu of this it is quite possible to accomplish the purpose which I have in mind by the introduction of properly prepared leaflets on nature study, having special reference to agriculture and related subjects. I therefore propose to prepare, at the expense of the University, and for gratuitous distribution, leaflets upon the following subjects: Economic botany and nature study; animal industry, including dairy; veterinary science; household economy, including suggestions with regard to fuel and its use; air and ventilation; water; and how to detect its impurities; the chemistry and hygienic effects of petroleum, natural gas, sugar, salts, fats and oils, soap, milk and butter, meat, flour and bread, and cooking. These leaflets will be sent to the county superintendents, and by them distributed to the teachers, by whom they could be used in various ways with the children."

Professor Geeting informs me that he is in full accord with Dr. Smart; that he believes these leaflets will prepare the way for text-books that will afford the practical and needful instruction, the tendency of which will be to place agriculture where it belongs—among the sciences. I hope, gentlemen, you will indorse Dr. Smart's offer. I believe it will inaugurate a new interest in agriculture. A few days ago I appointed Prof. Troop, of Purdue University, State Entomologist. There was no statute providing for such an appointment, but the unwritten law of necessity, it seemed to me, justified the act. This necessity emphasizes the need of instruction in entomology. When we shall have learned to properly appreciate agriculture and accord to this vocation its merited honor, then will we magnify our calling and increase our self-respect. When the farmer realizes that the mind is the important factor leading to success, then will he cultivate his reasoning powers. Books and papers will be multiplied, modern improvements will find their way into the farm home. Then comfort, beauty and attraction will be found in rural dwellings. Intellectual and social improvement will follow. The tide will then be turned from the city to the farm. The young men will see possibilities for as grand success on the farm as are offered in any of the business or professional pursuits. I hope, gentlemen, in your wisdom, you will realize the need of taking this initiatory step looking to the advancement of agriculture in our great State.

Mr. Niblack: I think the Governor has struck the keynote and given us some very valuable and timely suggestions. I move you that the Governor's address just delivered be submitted to a committee of three, with instructions to prepare such resolutions as may be appropriate in the case.

Mr. Stevens: I think the time has come for this State Board to broaden its work a little.

Mr. Levering: Dr. Smart, of Purdue University, is present and has a resolution to offer to this body. I believe it will be well to have that resolution read and add it to the work of this committee, and act on them both at once.

Dr. Smart: I think the Governor stated the case. I knew he was very much interested in this suggestion, especially the question of migration from the country to the city. In the conversation I had with him upon the subject, I made some suggestions, hardly supposing that he would indorse the views I held; but I am delighted to know that the Governor thinks the views I held of so much importance as to make it the subject of an address this morning. I think the Governor is right in saying that there is very little that directs the attention of the children to their rural life. Take our readers, our histories, our geographies and arithmetics, and you will find that they pertain largely to questions that pertain to cities. So in various ways the minds of the children are directed away from home; but much is being done in various parts of the country to counteract this tendency. We are not going backward; we are going forward, and it was with the view of helping the forward movement that I became interested in the matter. It seems to me that this work can be done if we can secure the co-operation of the teachers of the State. They should have the purpose in them of teaching the children to observe things around them. Not to tell them about the stars and things that are far remote from them, but to get the habit of observing the wonders around them, and from that to become interested in the various vocations that are found in the country, and thus acquire a love for agricultural pursuits.

I think the best way to accomplish what the Governor has in mind is to send out leaflets on nature studies. Now, if we can have the co-operation of the Board of Agriculture, and through it the co-operation of the teachers in the country schools, I think we can make a great success. I am willing to put in all the energy I have to spare to do what can be done, and if the scheme fails, I don't believe it shall be laid at the door of Purdue.

The motion to appoint a committee to report on the Governor's address was seconded and carried. The following committee was appointed: Messrs. Niblack, Jones and Hobbs.

Mr. Bales. We are going to elect members of the State Board of Agriculture this afternoon. I believe that it is for the benefit of agriculture that we should have practical farmers members of our State Board of Agriculture. I think we could with as much propriety elect a farmer to the ministerial association as we could elect a minister to the State Board of Agriculture. No one but a practical farmer could give such an address as the Governor just gave us. In making preparations for our exhibit at the Columbian Exposition, a professional man was engaged in the work, and he stored in the basement of this building vegetables which he expected to carry through the year. A farmer is a man who lives upon his farm; an agriculturist is a man who owns a farm and lives in town and carries on some other business to pay the expenses of his farm. As the President says, let the program go according to the advertisements, and you will have the co-operation of the farmers of Indiana. I do not see why we should have one special day as "Farmers' Day." Farmers' Day should be the entire week.

Motion of Mr. Jones, that a recess be taken until 2:00 p. m., prevailed.

AFTERNOON SESSION.

REPORT OF SECRETARY FOR 1897.

RECEIPTS.

Appropriations	$10,000 00
Rents	1,458 30
Privileges	2,040 20
Stall rents	1,046 00
Entry fees	5,280 00
Exhibitors' tickets	580 00
Admissions	29,077 20
Loans from State Bank	5,886 33
Insurance	1,472 62
Miscellaneous	319 15
	$57,159 80

DISBURSEMENTS.

Overdraft last report	$372 78
Mileage and per diem	4,510 38
Salaries	3,039 19
Postage, telegrams and express	402 66
Printing and stationery	1,801 01
Advertising	2,733 70
Construction and repairs	6,565 77
Banking, interest and rentals	8,678 53
Insurance	1,232 74
Furniture and tools	136 52
Claims of past years	1,930 10
Miscellaneous	559 57
Expense of exhibition	4,290 22
Premiums	19,296 93
	$55,550 10
Balance	1,609 70

STATEMENT OF RECEIPTS AND EXPENSES OF FAIR.

General admissions,	September		14th	$715 75
"	"	"	15th	2,080 50
"	"	"	16th	5,099 50
"	"	"	17th	15,517 50
Grand stand	"	"	14th	96 45
"	"	"	15th	296 70
"	"	"	16th	277 75
"	"	"	17th	4,799 75
"	"	"	18th	192 00
General	"	"	18th	443 25
Special admissions				1,255 40
Exhibitors' tickets				580 00
Privileges				2,040 20
Stall rents				1,046 00
Entry fees				5,280 00
				$39,720 75

EXPENSES.

Premiums paid	$19,296 93
Expenses of exhibition	4,290 22
Postage, telegrams and express	492 66

Printing and stationery		1,801 01
Advertising		2,733 70
Per diem and mileage		4,510 38
Salaries of officers		3,039 19
Amount cleared on fair		3,556 66
		$39,720 75

CREDITS.

I., D. & W. Ry. coupons	$642 00	
E. P. Fuller, note	100 00	
Balance due on hay	117 00	
H. B. Howland	24 00	
		$883 00

CLAIMS.

Crescent Paper Co	$2 40	
Indianapolis Plant and Flower Co	29 68	
Clemens Vonnegut	8 95	
C. W. Meeker	13 00	
D. M. Brown	3 55	
James Langtry	1 50	
Mortimer Levering	13 00	
James E. McDonald	5 50	
R. H. Mattern	25 00	
		102 58
Net credits		$780 42

PROPERTY VALUATION.

Eighty acres land and improvements	$145,000 00	
Improvements on leased land	10,000 00	
Engine and pump	250 00	
Sprinkling wagon	200 00	
Six thousand chairs	1,000 00	
Furniture and fixtures	200 00	
Credits	780 42	
Cash in hands of Treasurer	1,609 70	
		$159,040 12

REPORT OF TREASURER.

Received from all sources during year		$57,159 80
Amount overdraft January 1	$372 78	
Paid warrants drawn by Secretary	54,792 20	
Warrants outstanding	385 12	
		55,550 10
Balance on hand		$1,609 70

REPORT OF GENERAL SUPERINTENDENT.

To the President and Members of the Delegate Board of the Indiana State Board of Agriculture:

Gentlemen—In making this, my annual report, I will say that we had a very successful Fair, as the Secretary's and Treasurer's reports will show, and I think that the report of the Department Superintendents will show that almost every department was full to overflowing. As my report will be on grounds and buildings, it will necessarily be short. In the spring the Board ordered most of the buildings painted, which was done, greatly adding to the appearance of the grounds, as they were all painted white, representing somewhat the "White City" on the lake. They also induced the street railway to extend its tracks and unloading stations into the grounds, unloading the passengers right at the grand stand, which was certainly a very great improvement. That, with the erecting of a long-needed office for the Mechanical Department, is about all of the improvement of a permanent character made within a year. The storm we had during the Fair did quite considerable damage, blowing down the entire south end of the Swine Department, also blowing down one or two smaller buildings, and did a great deal of damage to our beautiful grove. After seeing the grounds this morning and viewing the surroundings, I would recommend that, unless the Board would need more space for their exhibit, that they would not rebuild that part of the swine barn which was blown down; and, if they have to rebuild, that they select some other location. As it is now, it adds very materially to the appearance of the grounds.

A detailed report of all receipts and expenditures is shown in the Secretary's report.

Most respectfully submitted,

E. H. PEED,
General Superintendent.

President: The next thing in order is "The Cattle Interests of Indiana—How They Can Best be Improved," by ex-Governor Claude Matthews.

EX-GOVERNOR MATTHEWS' REMARKS.

Mr. President and Gentlemen of the State Delegate Board of Agriculture—I come before you this evening under somewhat embarrassing conditions, and somewhat as an apologist for our worthy Secretary. When he wrote to me, as he did a short time ago, asking me to prepare a paper to deliver on the cattle interests of the State, I wrote him that it would be absolutely impossible for me to do so, owing to many pressing engagements. But I see that I am down on the program to lead the discussion on the cattle interests.

Now, we may be familiar with a subject all our lives, as I have been with the cattle industry all my life; and my business has been the breeding of the various breeds of catttle for stock purposes—yet, however familiar I may be with the details of that work, and with the industry, this is an undertaking without preparation; and for me to undertake to make intelligent statements here before such a body as this, it is certainly very embarrassing. I do not feel equal to the emergency. I have had no time to prepare myself on this subject, having been engaged with the Auditing Committee ever since my arrival; and I do not feel that in justice to you, and to myself, that I should undertake any worthy discussion of this subject at this time. Of course, we all have our ideas on this subject, and feel and believe that we know as much about cattle as we ever did in our lives, but so far as treating this subject in the manner in which I am asked to do, I must say that I am a little bit rusty.

Whatever may be the number of cattle in Indiana to-day—there may be something like half a million head of milk cows—statistics show that in the last year, through various causes, there has been a great loss in the number of the cattle in the State. What these causes may be, or the character of these catttle, and the per cent. of them may be, I have not had time to investigate. There is a certain per cent., however, that can be arrived at in the number and value of the improved breeds of cattle compared with those known ordinarily as "native cattle."

I think it would be the best thing the cattle men of the State could do, for the organizations of the different breeds to get together and perfect an organization embracing all the different associations as we have them now. That is, the Shorthorn Breeders' Association, the Jersey Breeders' Association, etc.—all get together in one State organization. In certain localities some breeds of cattle will succeed better than others, but if I were to express my preference, it would be for the red, white and roan, the noblest breed of cattle, I believe, there ever was. It would not be hard to estimate, in the course of ten years, what the value of the cattle industry in this State would be. There are various things to be taken into consideration in the improvement of the native breeds of cattle, not the least of which is the corn crib.

Now, with this apology for the mistake of the Secretary of the State Board of Agriculture, I hope that I have opened the discussion so that we will hear from some of the rest of you; and, with your permission, I will retire to complete my work upon the Auditing Committee.

President: If any one has anything to say along this line, we shall be pleased to hear from you on the cattle interests of Indiana—our leading interest. Would like to hear from some of the leading breeders.

Secretary: Mr. President, I desire to make a statement to the Convention in regard to what ex-Governor Matthews has said. He stated to me that he did not have the time in which to prepare a discussion on this subject, but I thought it possible for him to open the way so that this matter might be discussed, and I think he has opened the discussion so that the subject may receive a thorough consideration.

Mr. Kingsbury: I am in favor of the plan of combining the different branches of breeders. I should like to see that kind of organization started. I believe it would be to your interests and to the interest of the State.

President: It seems to me that there should be more interest taken along this line.

J. B. Smith: Mr. President, I am surprised that so little is said or prepared to be said on this subject, because the cattle interests in this State is very large. Some of us have seen a good deal of change in the cattle business from the earliest settlement of the country to the present time. I very well remember the first cattle that I ever saw exhibited in our country. They were a very ordinary and old-fashioned cattle as compared with the improved breeds of to-day, but they were celebrated in their day. There have been great advances in the cattle industry since then, but not the advances there should have been, and I am surprised that there is not more talk on this subject. What is needed, of course, is a combination in order to work the interest up to what it ought to be. Now there has been a great depression in the cattle business, and one of the causes is that there is no profit in it. The cattle have not been put on the market at little enough cost to make the business profitable.

REPORT OF AUDITING COMMITTEE.

To the State Board of Agriculture:

Gentlemen—Your committee to whom was referred the auditing of the Secretary's and Treasurer's books and accounts, respectfully report that the books and accounts and vouchers have been carefully examined and compared, and they have been checked over and found correct as read in the reports in detail made by those officers. A difference of 70 cents only is found between the accounts of the Secretary and Treasurer.

Your committee recommend that, in the future, demand for payment of all warrants issued by this Board or its officers shall be presented for payment before December 1st of each year; and, further, that the books of the Secretary and Treasurer be closed at that date and ready for examination by the 10th of December of each year for the Auditing Committee.

It is further recommended that the Superintendent, Janitor of Grounds, or any person authorized by this Board to sell or dispose of any material or produce, shall, on or before December 1st of each year, file with the Secretary of this Board an itemized statement, setting forth the name of the purchaser, kind of material sold, the amount of sale and time of payment.

Respectfully submitted,
MORTIMER LEVERING,
CLAUDE MATTHEWS,
AARON JONES,
Committee.

President: The nomination of candidates for membership on the Board to fill the vacancies occurring in the 1st, 2d, 3d, 4th, 7th, 14th, 15th and 16th districts is now in order.

John C. Haines, of Lake, Spencer County, was placed in nomination by Robert Mitchell, as candidate in the 1st district.

The name of Hon. Mason J. Niblack was presented as candidate in the 2d district.

Mr. W. W. Stevens was nominated for the 3d district.

Mr. J. W. Lagrange and Mr. E. A. Robison were placed in nomination for the 4th district.

Mr. Hiram B. Howland was placed in nomination for the 7th district.

Mr. Cott Barnett and Mr. Joseph Cunningham were placed in nomination for the 14th district.

Mr. Aaron Jones was nominated for the 15th district.

Mr. J. E. McDonald was placed in nomination for the 16th district.

President: Are there any other nominations? If not, the nominations will for the time be closed.

Mr. Mitchell: Mr. President, I desire to call your attention to the situation in the 9th district, of which Hon. Claude Matthews is the member. The rule heretofore has been that when a member died, a successor should be appointed to serve until the next meeting of the Delegate Board, and at such meeting to elect a member to fill the unexpired term. Mr. Matthews was appointed to fill the vacancy caused by the death of Mr. Sankey, and I think it would be well for us to nominate ex-Governor Matthews for the 9th district to fill the unexpired term.

President: That is also my opinion, Mr. Mitchell; I think you are right.

Mr. Mitchell: Mr. President, I nominate Hon. Claude Matthews for the 9th district.

President: I take it for granted that we will all agree in this matter. Upon the death of Mr. Sankey, of the 9th district, the Board filled the vacancy by the appointment of Mr. Matthews. That being the case, Mr. Mitchell places in nomination for the 9th district Mr. Matthews for the term of one year to fill the unexpired term of Mr. Sankey. Are there any other nominations?

CATTLE INTEREST.

Mr. Strange: I have talked with several cattle men and find that they are all in favor of having all the various cattle organizations combine in one organization. It seems to me that there should be enough representatives of each of the cattle organizations in this meeting to get together and hold a consultation as to the organization of an Indiana Cattle Breeders' Association. We have a good deal of time this afternoon, and for one I am willing to stay. I belong to the Shorthorn Breeders' Association, but I am ready to join the other breeders in an effort to organize all the cattle breeders of the State.

Mr. Mitchell: Mr. Strange has called up a very important question. I am sure that if the different stock breeders' associations should combine and hold their meetings—one each week—we would not get the benefit of reduced railroad rates, as we would if they were all held during one week.

Mr. Strange: These meetings should all be held the same week, and we would then get the benefit of the meetings of the State Board as well as our own meetings, and also the reduced railroad rates. I am sure that any farmer or agriculturist can spare the time for one week to attend these meetings. But to make trips at two different periods—my business arrangements would perhaps be so that I could not do so. Let one meeting follow the other.

Mr. Mitchell: I don't think it would work, for the State Board takes up three days, and I should like to see that occupy more time of the week, so that would leave very little time for the other meetings. What is your idea, Mr. Kennedy?

Mr. Kennedy: Mr. Strange's idea seems to me to be the only solution of the problem—that is, bring all the interests here at the same time. I think the associations could arrange their meetings so there would be no conflicting of dates.

On motion of Mr. Mitchell, a recess until 8 p. m. was taken.

EVENING SESSION, 8:00 P. M.

THE SUGAR BEET AND BEET SUGAR.

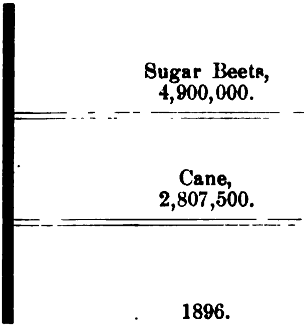
WINTHROP E. STONE, PH. D., PROFESSOR OF CHEMISTRY, PURDUE UNIVERSITY.

Evolution teaches that a particular organ may be unusually developed by favoring conditions. The human sweet tooth is such a product of evolution. It is a characteristic of civilized and highly developed people, which finds statistical expression in the millions of dollars annually spent for sugar by a great nation. To satisfy this national American sweet tooth last year required 2,000,000 tons of sugar, costing $100,000,000. If each individual in the United States got his equal share of this, he had 62.6 pounds.

From daily experience we know that sugar has become one of the commonest articles, and one may almost say necessities, in the dietaries of all classes. With the exception of England, which annually consumes 80 pounds of sugar per capita, no other people is so thoroughly sweetened as our own, the nearest approach being the Danes, who consume 45 pounds per capita.

Perhaps no other fact so well illustrates the immense advance made in the living conditions of what may be called the poorer classes as this—that sugar, at one time a luxury enjoyed by princes only, is now the most democratic article of food and literally sweetens the humblest meal.

We need not turn back the pages of history very far to learn of the time when sugar was unknown as an article of food. As an eastern luxury of uncertain origin, it tickled the palates of the Crusaders and was by them brought home to Europe. At first it was only regarded as a medicinal substance, and some centuries elapsed before it became an article of common use. The discovery of the new world and the extension of European commerce into tropical lands were two prominent factors in introducing sugar into Europe and encouraging its consumption from the fifteenth century on. It is interesting to compare the cost of sugar in the early days of its use with present prices. In 1319 one pound of sugar was purchased for the use of the Royal Scottish household, for which was paid 1s. 9½d., a sum which in purchasing power was the equivalent of about 10 shillings or $2.50 to-day. When the Pilgrim Fathers made their exodus from the old world, a pound of sugar cost in England a sum equal to 3 shillings or 75 cents to-day. In 1800 sugar cost 8d., which may fairly be taken to represent 1½ shillings or 38 cents of modern currency. Only a few years ago the price of sugar in America was cut in half, and now for a dollar your grocer will weigh out for you 17 or 18 pounds of the best granulated sugar the world has ever seen.



Up to the beginning of the nineteenth century the sugar of commerce was wholly derived from the sugar cane. Since that time the beet has presented a constantly increasing claim as a factor in the world's sugar supply. Sugar-making from beets is now one of the most important, if not principal, industries of northern Europe, where it has been developed from the industrial, technical and scientific standpoints to a remarkable degree. Of the total sugar production of the world in 1896 (7,707,500 tons), 4,900,000 tons, or 63 per cent., was beet sugar. Of this beet sugar the United States made only 40,000 tons, the remainder being produced in Europe. The sugar trade of the world is dominated by Europe from an area not larger than a single one of our States.

In general the American public knows little of this industry as regards either its actualities or possibilities, although no small fund of reliable experience and information has been gathered by certain pioneer manufacturers in this field, as well as by the excellent scientific investigations by the United States government and the various experiment stations in different States.

Vilmorin Sugar Beet.

In 1747, Andreas Margraf, a member of the Berlin Academy of Sciences, discovered the existence of sugar in the common beet root, but during his lifetime no practical application was made of this observation. A contemporary, Franz Achard, followed Margraf's discovery with some practical experiments, and in 1798 produced beet sugar in appreciable quantity. The first beet sugar factory was built and operated by Achard in 1801, but neither Margraf nor Achard lived to see the industry which owed so much to them established on a firm footing.

We turn rather to France to follow its development through the experimental stage. Napoleon's embargo, closing all European ports to English vessels, cut off the supply of sugar for the continent to a large degree, and under the stimulus of this condition no less than by the financial support offered by Napoleon in the form of prizes and subsidies, the making of beet sugar soon became a practical industry, which by 1830 had gained a firm footing and since then has steadily made its way against all competition. In order that we may understand the failure of the industry in Achard's time it is necessary to know, first, that the best beets at his disposal contained only 5 or 6 per cent. of sugar, while under the most favorable conditions a modern factory can not profitably work beets of less than 12 per cent. of sugar; second, to secure crystallized sugar of agreeable taste from the beet requires special and skillful treatment not necessary in the production of sugar from the cane, and wholly unknown to Achard.

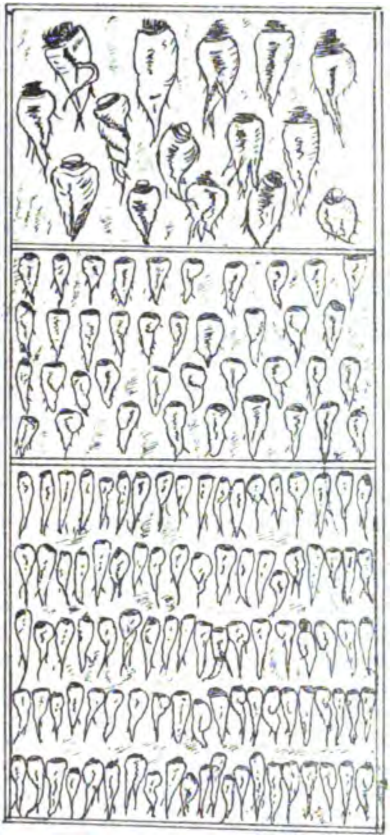
To breed a new and richer race of beets, and to work out methods for extracting and purifying the sugar contained in them, were problems requiring half a century of study and trial and not infrequently disappointment. These difficulties do not confront those who would now establish the industry in America. Beet seed is readily obtainable from which beets containing 12 to 15 per cent. of sugar can be grown with remarkable certainty and the regular factory methods extract 95 per cent. of this in merchantable form.

The extraordinary interest lately shown in this country regarding the beet sugar industry has stimulated a desire on the part of the public to know more about it, and has also rendered the dissemination of reliable information highly important in order to balance the sanguine and sometimes misleading statements of "promoters."

The sugar beet in its present form is a kind of thoroughbred plant, which has had its original qualities greatly modified so as to emphasize to the greatest possible degree one characteristic, viz., the formation and storage of sugar in its tissues. Like all intensified organisms, it tends to degenerate and revert to its original state. To maintain this high standard, the mother beets for growing seed are selected each year from those which by actual chemical test show the highest percentage of sugar, not neglecting other characteristics, such as form, color and size.

Out of many varieties which have been tested in this country, two are regarded as superior to all others, viz., "Vilmorin's Improved" and the "Kleinwanzlebener." Each has marked characteristics, while resembling each other in a general way. The Vilmorin is hardier and less susceptbile to conditions of soil and climate and perhaps is slightly richer in sugar. The Kleinwanzlebener is lighter in color, has curled leaves and is said to give a slightly larger yield. Several years of experimental results obtained in all parts of the State by the Experiment Station show little choice between these two varieties.

The typical sugar beet is smooth, conical in shape, with undivided root and small top. It should not much exceed a pound in weight. Large beets are inferior to small ones, both in the amount and purity of the sugar present in them. Pound for pound, small beets contain more sugar than larger ones, as a comparison made at the Purdue Experiment Station well shows:



Fifteen large beets. Weight, 40 pounds. Contain 4 pounds 4 ounces of sugar.

Thirty-nine medium beets. Weight, 40 pounds. Contain 4 pounds 14 ounces of sugar.

Ninety-six small beets. Weight 40 pounds. Contain 5 pounds 10 ounces of sugar.

The sugar beet is unlike other field crops, in that its value is largely dependent upon its quality. If it falls below a certain standard it will be wholly rejected at the factory, and so the aim of the grower is bent toward attaining, first, quality, and then quantity, to which every favoring condition must be made to contribute.

Temperature, rainfall and soil are the three natural conditions most influencing the result. To these are to be added the selection of seed and cultivation. Of these all, temperature is quite out of the control of the grower. Rain may be replaced by irrigation; the soil modified by fertilizers, but the beet can only be grown where the natural temperature is favorable. It does not succeed in hot climates and will never compete with the sugar cane for the possession of the Southern fields. In northern Europe, where its production has attained great proportions, the climate is cool and moist, and in general it is agreed that an average temperature of 70 degrees during the months of June, July and August is most favorable to its maturity.

If on the map of North America we draw a line from east to west through those places having this average summer temperature and include with it an area of 100 miles width on either side, we have an irregular belt which theoretically will be the sugar beet belt of the United States.

Kleinwanzlebener Sugar Beet.

All of the beet sugar factories now operating in America are within this belt, and the actual tests made by the experiment stations show that the best beets, as a rule, are produced in this region. It does not follow, however, that good beets will not be grown outside of it where other conditions are unusually favorable.

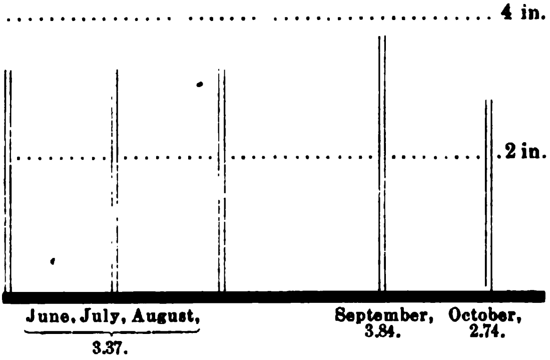
From two to four inches of rainfall or its equivalent for each of the summer months are essential. Beets are grown in a rainless region in Utah by irrigation with good success. It is said that any soil capable of producing good general crops will also succeed with beets. A clay soil is, however, least favorable and a well-drained loam the best. A fertile, porous soil, not too light in character, well drained, but well supplied with moisture from below, offers the best conditions.

The question will naturally arise to your minds as to how far the conditions of temperature and rainfall and soil in the State of Indiana are favorable to the growth of the beet. During the past ten years the Experiment Station at Purdue has been accumulating information on this score, which may be regarded as singularly impartial and accurate. The results of these inquiries have been published from time to time in bulletins and annual reports since 1890. They cover the points of natural conditions, temperature, rainfall and soil; of varieties, cultivation and diseases and of yield and quality.

In brief, these observations show that the mean temperature of the northern half of the State is about 71.5 degrees, and for the whole State 72.5 degrees. The average monthly rainfall for June, July and August is 3.37 inches; for September 3.84, and for October 2.74. The topography and soil of much of the State seem well adapted to beet growing.

Several hundred field tests covering a series of years have been conducted under the direction of the Station, to the point of harvesting and testing the mature beet. These tests have been made in sixty-three different counties. The average percentage of sugar in all of the tested beets grown in each county is shown on this map. In thirty-three counties the average is above the factory standard of 12 per cent., and in thirty below this standard. It is not to be concluded, however, that beets can not be grown successfully in these latter counties. The true interpretation is, that whenever in the State the beets have been given the proper cultivation upon proper soils, the results have been successful, and that in no county will there be a failure where these conditions are observed.

MONTHLY RAIN FALL.



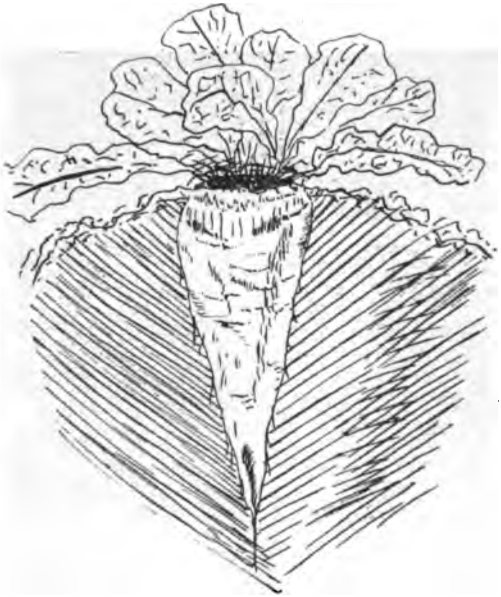
Nevertheless, the northern counties, and especially those along the Kankakee River, have thus far made the best showing. The best beets tested have come from Starke County. One field in that county yielded this year fourteen tons to the acre of washed and capped beets. Many of the beets taken at random from this lot contained 18 or more per cent. of sugar, and one, the portrait of which is given, contained 22.9 per cent. of sugar in its juice. This was the best beet ever grown in Indiana, and among the first rank of beets ever grown and tested in the world.

These results prove beyond doubt that large areas of this State are adapted by soil and climate to the successful culture of the sugar beet.

Let us now consider some of the essential features for the proper cultivation of the beet. It is to be borne in mind that it develops under ground, expanding downward and laterally against the pressure of the surrounding soil, and this points at once to the necessity of loosening the soil to a degree far beyond that usually practiced. The average beet sends a tap-root down to a depth of ten inches, while the fine secondary roots penetrate much farther into the soil. If the soil is loose the beet develops normally, but if the soil has only been plowed to a shallow depth, two undesirable results will follow. (1) The beet will raise itself out of the ground, rendering a considerable portion of the root worthless for sugar-making; (2) the tap-root in its effort to push downward will become branched and divided into a number of small roots of little value.

Indiana's "Banner" Beet.

Deep plowing is a prime necessity, therefore, in beet culture. The soil must be stirred to a depth of sixteen inches or more, which is best accomplished by plowing in the ordinary way to a depth of eight inches, following in the same furrow with some form of subsoil plow going down eight inches farther. In preparation for the seed the soil must be pulverized and smoothed to a much greater degree than for ordinary crops.



Sugar Beet in Ground.

It is important also that we give passing attention to the character of the beet as a feeder upon the constituents of the soil. In Europe the beet fields must be regularly fertilized at considerable expense. For the present this will not be the most urgent feature of beet-growing in this country. Indeed, too liberal applications of fertilizers of any kind induce the growth of large beets at the expense of sugar. The following table shows the amount of fertilizing constituents removed from the soil in sugar beets; 100 pounds of beet roots contain:

	Roots, lbs.	*Leaves, lbs.*	*Total lbs.*
Potash	3.3	6.5	9.8
Phosphoric acid	0.8	1.3	2.1
Nitrogen	1.6	3.9	5.5

The beet is a strong feeder, but it is to be borne in mind that the tops and leaves, which are removed before shipping to the factory and left upon the field, restore largely those fertilizing substances removed from the soil. The factory pulps, after the extraction of the sugar, is rich in nitrogen, which may be fed to cattle with profit.

The beet is not an exhaustive crop with rational management, which involves returning the greatest possible amount of each crop to the soil. As a factor in a regular system of rotation, the introduction of beet-growing would undoubtedly prove a great advantage to our present system of agriculture. In Nebraska the common practice is to plant beets, wheat and corn in succession, with an occasional fallow year.

Having made all ready for the seed time, the planting may take place in early spring, although in this region this will hardly be feasible before the beginning of May. Ten to fifteen pounds of seed should be sown to the acre in rows about 20 inches apart. Thick seeding is important, for it will be easier to thin out the plants later than to transplant into possible gaps in the rows. The young beet plant is an insignificant thing and for a time needs protection against the encroachment of weeds, while the soil must be frequently loosened, but not in a way to disturb the feeble plant.

This cultivation must largely be done by machines, which the American grower will find it to his advantage to employ upon every possible opportunity, for in this and all subsequent dealings with beets he will come into competition with European growers, who employ very cheap labor, performing most of the operations by hand. In certain particulars hand labor can not be dispensed with and this is likely to become the largest item of expense to the American beet raiser.

As soon as the plants have developed four leaves they should be thinned to a distance of 8 to 10 inches, saving the strongest and most vigorous specimens. Cultivation throughout the season should be frequent enough to keep the weeds thoroughly in check and maintain the ground in a porous condition until the leaves cover the surface. In all, six to eight cultivations should be given and toward the last care should be taken to keep the beet well covered with earth, since that part of the beet projecting above the ground and exposed to the sunlight is of little or no value to the factory.

Let not the prospective beet grower delude himself with the rosy hope that the sugar beet is unknown to bugs and worms, mildews and bacteria, which do so infect and corrupt all mortal things. These fellows are all wide awake as to the future possibilities of the sugar beet, although none as yet have shown a disposition to take more than a respectable portion of the crop.

There is a web worm which feeds upon the juicy part of the leaf, a flea beetle that punctures it with holes and cut-worms which gnaw at the young roots. Nematode worms infest the German beets, and in pursuance of our generous policy toward other foreign parasites, we shall no doubt soon welcome this new type to our fields. Bacteria have been found in beets grown at the Experiment Station under conditions which marked the occurrences as a regular disease, diminishing the amount of sugar and the purity of the juice to a very marked degree. The potato scab also evinces a liking for the beet, and we may reasonably anticipate if the latter comes into general cultivation there will be many interesting things of this kind for scientists to discover and the farmers to combat.

About six months are required for the growth and maturity of the crop. Light frosts work no harm, but severe freezing and thawing diminish the percentage of sugar rapidly and the harvest should, of course, precede the season when such weather is to be expected.

Thinning Out Beets.

Another danger to the mature crop is the beginning of a second growth, induced by mild weather, which speedily destroys the value of the roots for sugar-making. To avoid this danger the practice of loosening the beets with plows is resorted to, the effect being to break off the fine feeding roots and render further growth impossible.

When a healthy sugar beet has for six months striven to establish itself in a permanent way in the ground it becomes, to use a common term, "firmly rooted." To dislodge this beet from its position unaided would demand all of the strength of a man. It is a dynamometer of as great efficiency as the testing machine with which ambitious youths are wont to try their strength at the county fair.

On an average 40,000 beets will be firmly fixed in the subsoil of a one-acre field. It will be seen, therefore, that after the beet has been successfully grown, a problem of no mean proportions still confronts the farmer.

It is impracticable to pull the roots, and a number of digging machines have been devised for this work.

Now comes an operation for which no mechanical device has been found competent, viz., to "top" or "cap" the beets, or to remove the leaves and upper part of the root from which the leaves have sprung. Not only is this top less rich in sugar than the root, but it is richer in salts and other substances which seriously interfere with the factory operations. This top must, therefore, be removed before delivery to the factory. Indeed, most selling contracts stipulate that the price paid is for topped beets. This work must be done entirely by hand.

If not sent to the factory at once the beets should be protected from the sun and from drying up by loosely covering the tops, or if in danger of freezing they may be loosely covered with earth and so may be preserved in severe weather. The view shows how beets have been stored this way at the factory with good success.

From this very brief survey of the business of beet-growing it will be seen that it demands intelligence, diligence and vigilance. From the production of seed to the harvesting and preserving of the beet there is a constant effort to attain a high standard of quality, and having secured this, to retain the product in this condition.

It is now time to consider the very important question—does it pay? Beets are sold by the ton for from $4 to $4.50, delivered at the factory, but if they do not contain 12 per cent. of sugar they will probably not be bought at all. Some factories pay an additional price for beets of unusual richness.

Better than mere estimates for our guidance at this point will be the actual experience of others. In 1896 a careful record was kept of the expenses and receipts of 1,442 acres of beets grown in Nebraska by 49 owners. The average expenses per acre were:

Seed	$3 00
Rent	3 96
Labor	25 56
Other expenses	4 36
Total	$36 88
Yield 12½ tons per acre, at $4	50 00
Profit	$13 12

Six years' experience in Nebraska shows that the average cost of producing a ton of beets is $2.50 to $3.50 and the average yield 10 to 12 tons per acre. These are the most reliable figures obtainable and are derived from a community where the industry is on a sound footing and where the growers have become at least well posted—not to say expert—in the business. The natural conditions there do not differ greatly from those in Indiana and it would seem that equally as favorable results might be ultimately possible in this State.

Turning now from the field, let us give our attention to the beet sugar factory and its operations.

Perhaps the first question to be considered is the location of a factory, in determining which several things are to be taken into account. In the first place a tributary area of 2,500 to 10,000 acres of land, capable of supplying 25,000 to 50,000 tons of beets annually is essential. Since it will not pay to haul beets by horse or mule power more than four miles, some of this beet supply may come over railway lines; and since the factory consumes large amounts of other materials and ships away hundreds of tons of sugar, good railway facilities become a second indispensable requirement. Railways might well be expected to look with favor upon the establishment of factories upon their lines. It is said that Jay Gould once offered $75,000 for the location of a beet sugar factory on the Missouri Pacific Railroad.

To show you something of the demand made by a sugar factory upon the outside world, the following statement of materials consumed by the factory at Chino, Cal., in working the rather small crop of 1896, will be interesting:

150,000 sugar bags.
1,000 sugar barrels.
120,000 yards filter cloth.
1,000 tons coke.
700 tons lime.
9,000 tons limestone.
4,000 gallons gasoline.
55,000 barrels petroleum.
10,000 pounds tallow.
15,000 gallons lubricants.
1,000 pounds cup grease.
3,600 files.
1,200 pounds twine.
1,800 slicing knives.

A third necessity is fuel, in the form of coal, oil or gas, of which a very great amount is used for power and heat. Not only should this fuel be cheap, but it should be accessible at low cost of transportation.

Next is needed a supply of lime or limestone, of which great quantities are consumed in purifying the beet juice. Last, and of exceptional importance, is an abundant supply of pure water for steam making and particularly for extracting the sugar.

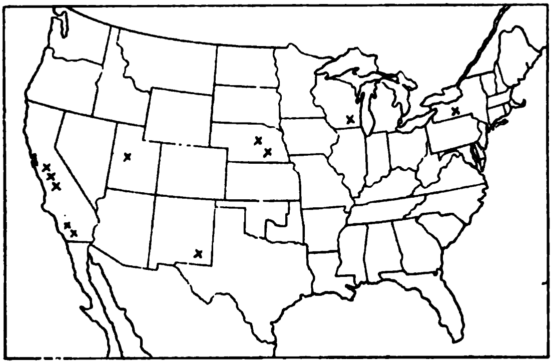
In connection with large water consumption, good drainage also becomes of great importance.

Eleven beet sugar factories are at this time in operation in the United States. The oldest of these was established at Alvarado, Cal., in 1870, and struggled many years under adverse conditions. A view of this is shown. The credit of its final success belongs to the brothers E. H. and E. F. Dyer, still prominently connected with the industry.

In 1888 Claus Spreckles built a factory at Watsonville, Cal., since enlarged to this plant, which is the largest factory in operation in America. In 1896-7 it worked 100,000 tons of beets into 20,000 tons of sugar. The farmers received for their beets $650,000.

The Oxnard brothers, who have been prominent in promoting sugar beet culture in America, have erected three factories, one at Chino, Cal., in 1891, and one each at Grand Island and at Norfolk, Neb., in 1890 and 1891. A factory was started at Lehi, Utah, in 1891, and another at Eddy, New Mexico, in 1896. A factory was also started at Menominee Falls, Wis., in 1896.

New factories now in operation for the first season are at Rome, N. Y., Salinas and Los Alamitos, Cal. The latter represents the latest and best ideas in beet factory construction and equipment, and, worthy of note, was built and fitted wholly with American materials and machinery. Several of the views which are presented are from this factory by the courtesy of the builders, the Messrs. Dyer.



The eight factories operating in 1896 produced over 40,000 tons of sugar, which will certainly be much increased the present season. A beet sugar factory capable of working 300 tons of beets daily would cost from $200,000 to $250,000. Experience shows that a factory of smaller capacity is operated less economically. It may also be said in passing that the manufacture of beet sugar on a small scale, like the production of maple or sorghum or even cane sugar, is quite out of the question, owing to the peculiar nature of the beet juice.

We come now to a closer view of the factory and its operations. The extraction of the sugar from the beet and the art of freeing it from its associated impurities is strictly a chemical process which has been perfected by a century of study and experiment. It is, moreover, conducted on a large scale and involves the use of apparatus of large size as well as of great precision.

The beet sugar factory is a scientific enterprise conducted on a large scale and with great care. To the casual visitor it presents a complicated and confusing aggregation of engines and pumps for compressing and exhausting; a labyrinth of pipes conducting water, steam, beet juices, air and carbonic acid gas; of diffusion cells, carbonation tanks and filter presses; enormous vessels for evaporating great volumes of water in partial vacuum, and centrifugal machines, all subject to constant control through the chemical testing of the products obtained, to the end, first, that all of the sugar in the beet may be extracted, and, second, to discover and prevent any loss or waste of this sugar in its devious course through the factory. I know of no better example of the application of scientific principles to a great industry than that presented in a well-arranged and properly conducted beet sugar factory.

It is a peculiarity of this industry that the raw material is only available during a portion of the year, and the factory operations are thus limited to a campaign of from three to five months in duration, beginning the latter part of October. During this time, however, the work is pushed continuously night and day, since many of the operations cannot well be interrupted.

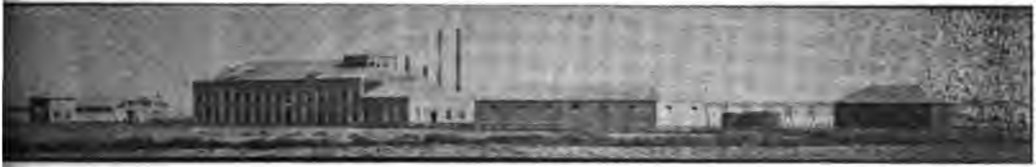
Upon arrival at the factory the beets are usually stored up in heaps or sometimes in sheds, but before they are accepted they are subjected to chemical analysis. The chemical laboratory is a very essential part of the plant, and is arranged to make hundreds of sugar determinations daily, as well as less frequent examinations of other raw material consumed.

From every shipment samples are taken, the juice extracted, and by the use of an optical instrument called a saccharimeter the exact percentage of sugar is determined. Upon the basis of this examination the factory disburses many thousands of dollars and the grower obtains pay for his season's labor and investment.

The average beet contains about 95 per cent. of juice, in which not only sugar but a number of other substances are dissolved. For sugar-making purposes all of the substances contained in the juice other than sugar are considered impurities. These impurities prevent the crystallization of the sugar, and in inferior beets may become so large in amount as to render the beet worthless. A beet containing 12 per cent. sugar and 3 per cent. impurities in the juice is said to have a purity of 80 per cent., which means that 80 per cent. of the total solid matter in the juice is sugar. Beets with less than 12 per cent. sugar and 80 per cent. purity are undesirable and are rejected by most factories.

From the storage bins or heaps the beets are carried into the factory in troughs through which flows a current of water which not only transports but washes them. Sometimes they are given a special washing by tumbling about in a large revolving crate partially submerged in water. By an elevator the washed beets are carried into the upper story of the factory to the cutting machine, or slicer, one of the many pieces of apparatus which has passed through various stages of evolution until now it is recognized as "just right." The beets fall upon a horizontal disk revolving with such velocity that the beets are pressed outward against the walls of an enclosing cylinder which is stationary and set with knives like a carpenter's plane. The beets are thus sliced into thin ribbon-like strips. This method of slicing is preferred to any other kind of rasping, grinding or chopping, the aim being to cut the tissues of the beet cleanly without bruising or crushing. The beet chips, or "cosettes," so called, pass down an inclined trough to the next lower floor of the factory and are introduced into the diffusion cells for extraction.

The diffusion process for the extraction of sugar is peculiar to the beet sugar industry, although beginning to be introduced into the cane sugar factories. The beet is essentially a watery or juicy root, containing, as we have seen, about 95 per cent. of juice. Its cells are thin-walled, and the greater portion of the solid matters of the beet are dissolved in the fluids contained in these minute cells.



Dyer Bros'. Factory at Los Alamitos, Cal. The Most Complete Factory in America.

If the beets are grated or crushed and the pulps pressed dry, the resulting juice includes all of these dissolved substances contained in the cell juice, sugar and nonsugar, alike. But it is the constant aim of the sugar maker to obtain a juice as free as possible of these nonsugars, because it is a costly operation to separate them from the juice afterwards so as to permit the sugar to crystallize. With the cane a crushing and squeezing process can be employed, because the cane is less juicy and its juice contains less nonsaccharine substance than the beet.

The extraction of the beets by crushing and pressing, as practiced formerly, was always attended by great disadvantages. The extraction was imperfect and the juice was impure. This method has now almost disappeared and been displaced by a process quite different in principle, known as the "diffusion process."

This is based upon the well-known scientific fact that the thin walls of the vegetable cell will permit water to freely diffuse through them and also such substances dissolved in the water as are crystallinic in nature. Non-crystallinic substances, even though dissolved in the fluids of the cell, can not pass in and out unless the membrane is broken. The application of this principle to extracting sugar from the beet consists in slicing the beet so as to expose the cells without cutting or breaking more than is necessary. The slices are soaked in water, which diffuses freely through the tissues, carrying with it the sugar and some impurities, but leaving others behind. The thin walls of the little cells are thus made to serve as a kind of sieve or strainer, assisting in purifying the juice at the very start.

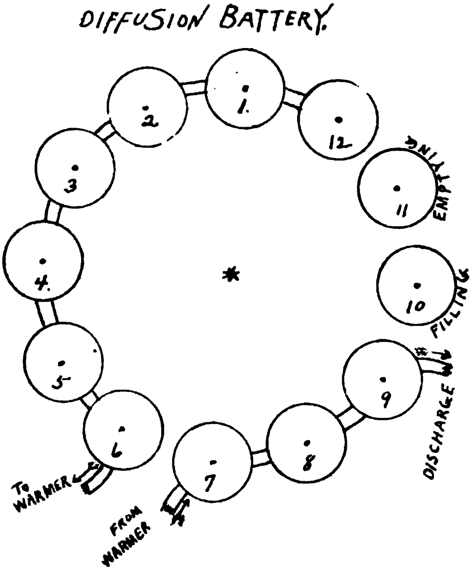
The apparatus used to accomplish extraction by diffusion is complicated but interesting on account of the completeness with which it does its work and the ease with which large masses of material are handled. It consists of 12 or 14 large, cylindrical vessels, constituting the diffusion battery, each capable of containing 2 or 3 tons of beet chips. These are connected with each other by a series of pipes conveying warm and cold water, steam and compressed air, and have openings above and below for introducing and removing the "cosettes" or chips. They are usually arranged in a circle so as to be supplied with chips by the swinging trough leading down from the slicer above. The cells are filled and emptied successively one after another in rotation around the circle. Two cells are thus constantly out of the series, undergoing emptying or recharging, while the remainder are being extracted. Before an entire round is made, each cell of chips is extracted 14 times. The fresh water enters through the cell which has been most times extracted and the juice emerges from the battery through the cell last filled with fresh chips.

Beets Arriving at Factory. Silos are Shown Between Tracks.

The extracted chips are forced out of the diffusion cell by compressed air, pressed dry and discharged to be used as cattle food. Scarcely a trace of sugar remains in the extracted chips, so thoroughly has the diffusion done its work.

The extracted or thin juice is of a pale, yellowish color and somewhat more dilute than the original beet juice. For instance, a juice containing normally 15 per cent. of solid matters would by the diffusion process be diluted about one-third so as to contain about 10 per cent. of dissolved solids, consisting of sugar and certain impurities. Were this a pure solution of sugar it would now be only necessary to evaporate the water and recover all of the sugar in pure crystals. This not being the case, unfortunately, the next step in its treatment is the purification process, which consists in heating the thin juice with lime. Preliminary to this it is measured, in order to ascertain the proportions of lime to be used, and goes thence to the saturation tanks.

These are large, cylindrical tanks, so arranged that the juice which they contain may be boiled by means of a closed coil of steam pipes at the bottom.

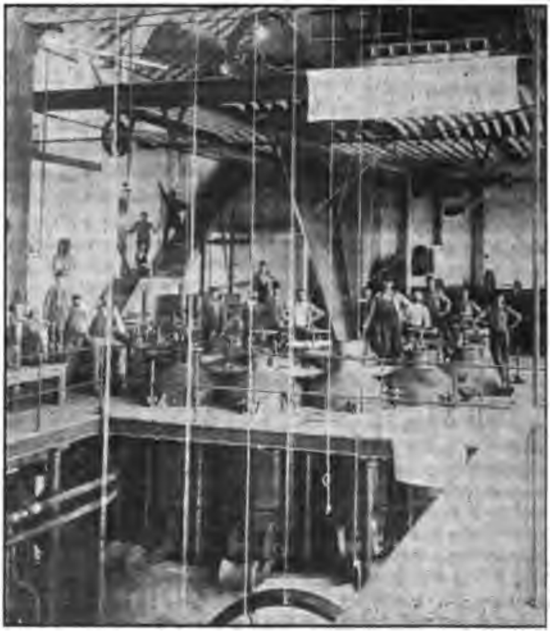


Explanation.—12, 1, 2, 3, 4, 5, 6 are in diffusion. Cold water is running in at 12, through the connection to 1 and so on; from 6 the liquid goes to the warmer; from warmer through 7, 8, 9, fresh filled cells, and then discharges into lime tanks. Ten being filled will be connected to 9, and thus the process continues in routine.

The thin juice being heated in these tanks to blood heat, a given amount of slacked lime suspended in water is added and thoroughly mixed. The juice is thus rendered alkaline and much of the dissolved impurities separate as flocculent particles, which settle to the bottom of the tanks. Some of the lime, however, combines with the sugar, and in order to liberate this sugar a stream of carbonic acid gas is caused to bubble through the juice, precipitating the excess of lime as calcium carbonate, which, as it settles, clarifies and purifies the juice still further. Lime to the extent of 2 to 3 per cent. of the juice, by weight, is used and the large amount consumed is commonly produced in the factory by burning limestone in kilns, so arranged as to retain and store up the carbonic acid gas for use in carbonating the alkaline juice.

The carbonated juice has meantime been heated nearly to the boiling point and is next sent to the filters, where it is forced under pressure through heavy burlap cloths in order to remove all suspended matter. The filter press is another evolution product of the sugar industry designed to meet the necessity of rapidly filtering large volumes of liquids.

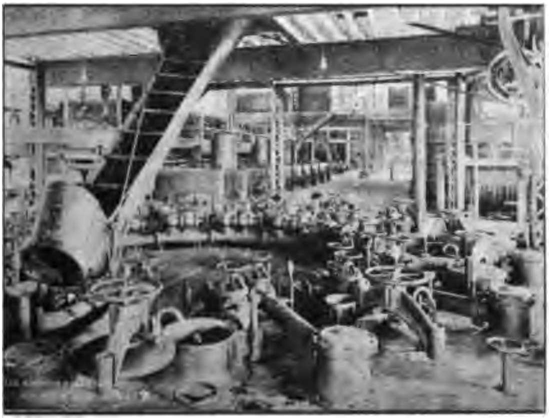
The present form of the filter press consists of series of frames of two kinds, the one solid with grooved surfaces, the other open. When placed side by side the central openings form a continuous passage through which the juice is forced. As arranged on a framework these frames alternate with each other and are separated by the filter cloths. The juice passing through fills the hollow frames and is forced through the cloth into the grooves of the solid frames and escapes below. When the frames become filled with solid matters, they are taken apart, the filter cakes discharged, the cloths washed and set up again for further use.



General View of Diffusion Battery. Slicer at Top, Trough Leads Down.

This press cake usually retains some sugar and may profitably be broken up, washed and the washings added to the next round of "thin juice."

The filtered juice is subjected for a second time to the process just described, viz., heated with lime, carbonated, and then before filtering sulphurized or treated with the fumes of burning sulphur in order to decolorize and bleach it. Then once more through the filters and the first stage of purification is completed. Sometimes the second filtration is done through bone black, also for the purpose of decolorizing, but this practice is not followed in any of the American factories. The juice still contains many substances besides sugar, but any further attempt to separate them from the thin juice would be impracticable. The final purification follows later.

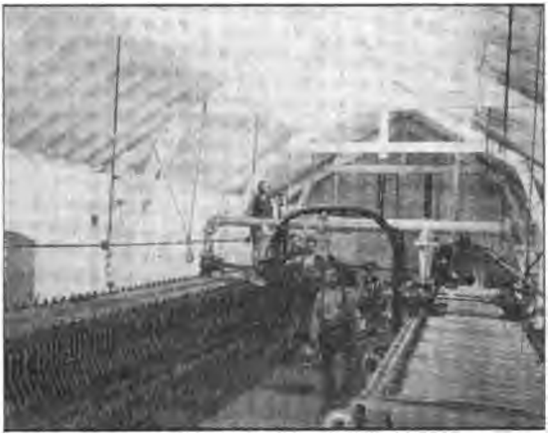


Bird's-Eye View of Diffusion Battery.

The sugar maker now has on his hands a large volume of liquid in which is dissolved 6.8 per cent. of sugar which he desires to separate in the crystal form. To accomplish this, 80 or 90 per cent. of the water must

Lime Tanks at Left. Evaporating Tanks at Right.

be removed by evaporation. To attempt this evaporation by boiling the juice in open pans as is done in making maple sugar, for instance, or was formerly practiced in making cane sugar, is quite out of the question in the modern sugar factory for various reasons, such as an undue consumption of time and fuel and a loss of sugar owing to destructive changes which occur when an impure sugar solution like this juice is boiled in open air.



Filter Presses and Tanks.

The evaporation of this water is effected in complicated and composing apparatus known as the "multiple effect," consisting of a series of three or four connected closed vessels, heated by steam and attached to powerful pumps, capable of exhausting the air from their interior.

The action of the "effect" is not only interesting, but it accomplishes a great saving of fuel and avoids a loss of sugar.

It consists of large, closed vessels, capable of being heated by closed coils of steam pipes. The interior of each vessel communicates with the heating system of the next. They are called, respectively, the first, second and third "effects." Sometimes a fourth is added to the series. The first is heated by exhaust steam from the engines of the factory, at a temperature of about 220 degrees F. The first "effect" being filled with thin juice, boils freely and the steam passes into the heating system of the second, at a temperature of 212 degrees. This would not be sufficient to boil the juice filling the second effect were it not that the pumps had created here a partial vacuum in which the juice boils readily at 190 degrees F. The steam at this temperature enters the heating system of the third effect, already exhausted to such an extent that the juice boils at 150 degrees F.

The steam from the third effect passes into a condenser filled with a spray of cold water and by its condensation maintains the vacuum. The exhaust-heating steam from the first and second effects is also condensed here, and so the three vessels are kept boiling at a much reduced temperature; in the first at 212 degrees, in the second at 190 degrees and in the third at 150 degrees, the only heat employed being the initial temperature of the exhaust steam supplied to the first. The evaporating chambers of the three vessels are in communication so that the juice passes freely from one to the other, thin juice entering the first, and the concentrated or "thick juice" being drawn off from the third.

Left—Evaporating Tanks Right—Lime Tanks and Filter Presses.
Background—Diffusion Battery.

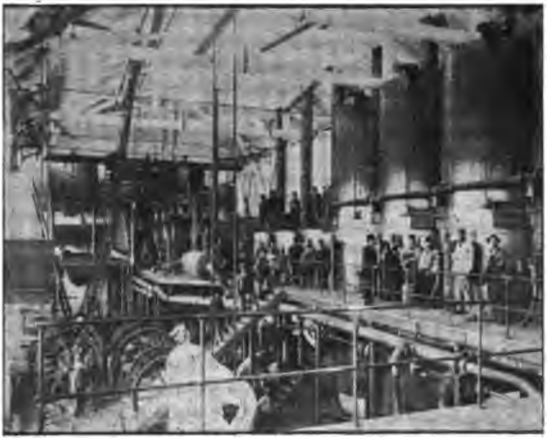
The economy of this device appears from the results, which show that in a triple effect one pound of exhaust steam will evaporate three pounds of water from "thin juice."

As discharged from the triple effect, the juice is of a syrup-like character. It has been concentrated from a thin fluid containing about 10 per cent. of solid matter to a syrup with 40 to 50 per cent. of solids. In the third effect it boiled at 150 degrees F., but in the open air would scarcely boil below 265 degrees. It is, however, not yet concentrated sufficiently to produce sugar crystals, and now goes for the final evaporation to the vacuum-strike pan to undergo what may be regarded as the most important of all of the factory operations.

The vacuum pan is a large pear-shaped vessel, with a capacity of several tons of thick juice and operated in a similar manner to one of the triple effects, the juice being heated by a steam coil and a vacuum created by condensing the vapors. Indeed, it is not different in principle from the effects, but is separated from them and placed under direct control, because the operation to be performed here is a critical one.

The position of a sugar boiler is one of the most important in the factory and requires long experience and skill for the successful fulfillment of its duties.

In carrying out this operation the pan is filled to the proper height with thick juice of 50 per cent. concentration, and a vacuum created by the use of the pump and condensation of vapors which enables boiling to go on at 150 degrees to 160 degrees F. As evaporation proceeds, new amounts of thick juice are admitted until the vacuum pan is filled with a syrup of a concentration of 90 to 95 per cent., boiling in a partial vacuum and freely charged with sugar crystals.



Carbonating Tanks—Right. Machinery—Center.

Now has arrived the critical point of the whole process, when the boiler must decide, if the moment has come, to discharge the contents of the pan. This is the art of sugar-boiling—to be able, quickly and accurately to decide for all sorts and conditions of syrups, when this mass of some tons of weight has attained just the right degree of concentration, to crystallize to the best advantage. If the boiling be stopped too soon the syrup will be thin and watery and much of the sugar will remain dissolved. If boiled too long the cooled mass will be sticky and the sugar crystals can not be separated from the molasses. There is little to guide his decision, save the intuition born of experience, aided by the appearance of the seething mass seen through the peep-hole and its "feel" when a sample is withdrawn and rubbed between the thumb and finger.

At the proper time the various air, water and steam valves are closed and the pan is discharged into a receiver in the floor below.

On cooling, the syrup becomes a semi-solid mass of sugar crystals mingled with molasses. This mixture is called "masse cuite." In the newest factory, at Los Alamitos, the "masse cuite" is kept some hours in crystallizing tanks, where it is slowly stirred at an even temperature, and under these conditions the crop of sugar crystals is increased.

Quad Evaporating System of Tanks.

The "masse cuite" is finally distributed among the centrifugals, where, being spun about at an enormously high speed in cylinders with sieve-like sides, the molasses is thrown off and there remains a mass of snow-white pure sugar, which has now to be dried and packed and is then ready for the market.

A ton of beets entering the factory at a given time will be separated in about eighteen hours into extracted "cosettes," weighing while moist about 1,000 pounds, and about 100 pounds of press cake, 250 pounds of pure sugar and thirty to fifty pounds of molasses. The cosettes have a very considerable value as a cattle food. The press cake may be used as a fertilizer and the molasses is utilized in a number of ways. It contains all of the impurities of the juice not removed in the filter presses, and is of too strong and disagreeable taste to be eaten. It still contains sugar which can be removed by special processes, or it is sometimes fermented and employed in making spirit.

The question is often asked if there is a difference between the sugar of the beet and that of the cane. The answer is, absolutely none whatever. In the raw or impure state, cane, maple, beet and sorghum sugar possess each a characteristic and distinguishing taste. This is due to the impurities. When these sugars are refined they are identical in taste, as well as in their behavior, to the most refined chemical and physical tests.

In conclusion, some results obtained in well-managed factories will illustrate the care with which the various operations are watched and controlled. In a certain German factory the following record for the season's work was obtained:

The Vacuum Passe. The Last Stage of Reducing the Syrup to Sugar.

Average sugar in all beets worked	12.92 per cent.
Average sugar recovered	12.26 per cent.
Average loss	.66 per cent.
Distributed as follows:	
Left in cosettes	25 per cent.
In waste water from diffusion cells	12 per cent.
Filter press scums	12 per cent.
Second filter scums	03 per cent.
Not accounted for	01 per cent.

For every 100 pounds of beets were consumed 4.6 pounds of limestone and 10.2 pounds of fuel.

From another factory the record reads: Every 100 pounds beets required 80 pounds steam and 7.8 pounds fuel. The 100 pounds of beets produced 180 pounds thin juice, yielding 16 pounds of "masse cuite," from which 11 pounds fine sugar was obtained. The best practice reduces the molasses to 1.4 per cent. of the weight of beets. The cost of working one ton of beets was distributed as follows:

Basement—Showing Water, Lime, Carbon and Sewer Pipes. Engines in Rear.

Fuel	**$0 43**
Limestone	**16**
Labor and silo	**56**
Maintenance	**15**
Sundries	**22**
Total	**$1 52**

It appears, therefore, upon a careful survey of known facts, that the climate, soil and all conditions of cultivation are favorable to the successful and profitable production of sugar beets in the State of Indiana. On the other hand, the manufacture of sugar from such beets is an established industry already in successful operation in several parts of the United States. If, moreover, we inquire into the advantages to be derived through the introduction of this new industry, we cannot long doubt that they will prove at once definite and attractive, involving diversity of agricultural interests, desirable rotation of crops and profit to the farmer; employment of labor, capital and transportation facilities to the community; and finally the home production of a staple necessity for which nearly $100,000,000 is now annually sent abroad.

Method of Storing Beets Until Factory Starts.

No valid objection to the industry can be advanced. There only remains to establish the necessary co-operation between farmers who are ready to raise the beets and capital ready to erect factories for extracting the sugar. When this has been accomplished with mutual confidence and carried out with good management, the time will not be long delayed when the industry will yield profitable returns, and we shall presently be able not only to supply all of the sugar for home consumption, but contribute something to the world's market.

Sacking Raw Sugar and Shipping to Refinery.

QUESTIONS AND DISCUSSION OF LECTURE ON THE SUGAR BEET INDUSTRY.

REPLIES BY PROF. H. A. HUSTON.

Is any of that sugar made out of beets on the market?

Sixty-three per cent. of all the sugar in the world is made from beets.

Is the granulated sugar, beet sugar?

Very likely. There is no way of ascertaining what the sugar on the market is made from.

Some years ago we had sugar on the market that was brown and a little damp. Was that beet sugar?

The brown sugar and all sugars on the market that is partly refined probably came from cane, because the raw sugar of the beet is not put on the market.

Is this beet anything like the beet that is used for feeding stock?

Yes, sir; it is superior to that in this respect: There is about half as much more stuff that you want your animals to have, and a correspondingly smaller amount of waste in the sugar beets than the mangel. The sugar beet is a little more difficult to handle than mangels, but it is superior for feeding to cattle, and gives no disagreeable flavor to the milk. The nutritive rates vary, and has no fixed rate like the cereal. When you come to feed the chips after the sugar is out, that makes a different kind of ratio.

What is the amount of sugar that is imported into the United States from France and Germany each year, and how much of our own manufacture goes into use?

The cash value for the last fiscal year was ninety-nine millions and a fraction of money which was spent for foreign product. Last year it was largely from Germany, but this year it is from France.

The Cuban sugar is cut off, while Indian and Egyptian sugar has taken its place somewhat. The relative amount of cane and beet sugar used in producing white sugar will depend upon the market. It is customary always to use some cane sugar. It is a matter of flavor and saves somewhat the cost of bone black.

How far south in the State of Indiana have you made your tests showing a profitable production?

The profitable production, so far as beets of satisfactory quality are concerned, and perhaps that is the only thing that we can deal with just now.

So far as satisfactory quality is concerned, we have gone as far south as Switzerland County. We got a satisfactory one from Vanderburgh County. I have received beets of fairly satisfactory quality from every part of the State. I do not think we ought to include such beets under the head of profitable beets, on account of the cost of working some land as compared with prairie land in the northern part of the State.

How about the labor of producing an acre of beets and an acre of potatoes?

There is a good deal of hard work involved in raising the beets. This comes in the thinning operation. While it is true that this must be done in experimental work, and while most of the beets in Europe are raised and thinned by hand, the American system has changed within the last few years. Wherever there are any considerable areas of beets raised, from ten to fifty acres in a patch, the custom is not for the owner of that land to thin those beets at all; but a division of labor is brought in. The farmer plows and subsoils his land, prepares it and sows the seed. His labor has practically ceased at that time. A contract system has been developed. One man employs a number of boys and laborers and goes about and takes care of the crops from the time of sowing until they are ready to harvest, at a certain fixed price per ton. His men have nothing else to do, and are entirely familiar with the work, and they do it rapidly. The farmer is thus relieved of the labor. That has gone a long way to solve the labor question in those sections of the country where the work is successful. The thing has reversed itself in one or two of the great California ranches where they first used this contract system, and now they hire their own laborers, but that is only where it is carried on on a very large scale. A man who would want to put in forty or fifty acres would be the one who would profit by this contract system. He takes little risk in such a contract, for the contract is paid on a tonnage basis and the superintendent at the factory agrees to take the beets if they are satisfactory, and thus they are all related in a contract for this kind of work. If any of you have a notion of doing experimental work, it should be done correctly. We have difficulty in getting people to do this work correctly. There is danger of doing a great deal of damage if you do not do the work right. If we get twenty results, for example, from a single county, they are averaged up, and this is supposed to be the average of that county and what that county may do. But that is not so. It means a jumble of good, bad and indifferent work, if you are fortunate to get any good work in that way. Wherever bad results are obtained, it is almost always on account of a lack of attention and improper working of the soil.

One essential thing is, if you are going to raise beets that are good for anything, and that is to subsoil the ground. The beet must be able to get down into the ground. If one makes experiments, and they are not successful, you do not simply lose your work—you do an injury to your community. I am a great deal interested in the matter, and have had charge of all the crops that have ever been raised at the Station, and the more I do of this work the more I feel like insisting that we should not injure our communities by doing this in an improper manner. We will assist you in every way in securing first-class seed—and that is not easy to do, for there is just as much difference between good and bad seed as there is between a scrub and a race horse. Give good treatment and you will raise good beets. I believe that this State has very great advantages over Nebraska; it is not equally good, it is superior. The working season here is twenty or thirty days longer than Nebraska's. We have a great deal better water. The soil on which this beet is grown out there is one worked with much greater difficulty than any of the soils in the northern part of this State. It is also subject to sandstorms, which sometimes cut off whole areas of beets close to the ground. I think the thing is well worth trying, but before one is expected to invest much money in beet growing it must be decided that beets of a satisfactory quality can be raised, and then whether the farmers are willing to raise them. Now, these two things can be found out only by experiment. Particularly the farmers must find out for themselves whether they wish to engage in this work. The farmer can only tell by experimenting, and it is for this purpose that we have carried on most of our experimenting in this State.

Does it follow that the per cent. as found in these counties might have been very much higher if the farmers had observed your directions carefully?

Yes. I know it is an unsafe thing to pick results, but if I could be allowed to select only the beets which were properly raised in this State, I would show you a very remarkable record. Showing as good as it does, it would be shown a great deal better if the directions had been carried out. Professor Plumb has been placed in charge of the matter of instructing farmers. He has been kept at work because we thought the time would come when you would want to know. When you agitate the question, as we were sure you would, we can prevent you from making mistakes and losing money, and, on the other hand, might be able to give you information to guide you if you want to go into the thing to make a good deal of money. We are not making money, we are not promoters; we simply give you scientific information. I have no doubt that if we could induce the farmers to do this as they ought to do it, very many counties that do not show a per cent. high enough might show better. It is the exception, where the instructions are fully carried out, and this is the result with instructions rarely carried out. I hope you see the value of the Experiment Station in an agricultural college. It will take a number of years to get at all the facts regarding the State of Indiana, and we expect to stick to it so long as there is any public interest in it. We are ready to help at any time without expense so far as we are able to give accurate information on this subject.

In a factory a large amount of water would be required. Would ordinary river water do, or would it require filtered water?

An ordinary pure water would suffice for this purpose. By that I mean a water that is sufficiently pure for domestic use.

Would it require the location of the factory on a large stream?

No; you can get a supply from wells of good capacity.

Is the refuse matter a matter that runs away—we have had some experience with strawboard mills—would it be poisonous to the fish?

The effluent waters from a sugar beet factory are largely distilled waters. The chips are dried; those are foods. Then there is the molasses. This does not flow into the streams. The molasses in many of the large factories is worked over; in other places it is used for mule feed, so there is little material getting away from the factory into the streams, and what does get away is not objectionable.

I notice that a large amount of lime rock and burned rock is used. Is it necessary to burn the lime before coming to the factory?

It is burned at the factory.

Is the quality of the beets dependent to any great extent upon the differences of the temperature or in the difference of the soil?

I think it is much in the difference of the rainfall. The difficulty is largely in the danger of a high autumn rainfall, which is apt to start the beet on its second growth. A wet, warm autumn is very apt to make the beets start up, and that is more likely to occur in the southern end of the State than in the northern. A beet is usually not very good when it starts a second growth, because it never ripens, especially if it has been arrested by a drouth in the summer. The beet might be accepted by the factory; it is not the best beet, but it is not lost. That is another feature in the character of this crop which perhaps has never been emphasized. A failure on account of drouth is not a loss, for the beets are high in sugar.

I notice that you put the cost of the factory at from $225,000, $250,000 or $275,000, and the capacity at 300 tons a day. At a capacity of 500 tons per day, what would it be?

It is said that a capacity of 300 tons a day is the under limit, and more than 1,000 tons a day is past the upper limit.

What would the cost of such a factory be?

I could not tell you; that is a pretty big question to answer.

Are we importing the machinery and fixtures for this factory?

No; we can produce it all in the United States. It might cost $300,000 for a factory making 300 tons a day; but it would not cost $500,000 for a factory making 600 tons a day.

Judge Martindale: The farmers through the Middle West have usually produced two or three very large crops together; or, whenever by diligence we stamp out the hog cholera, we have an overproduction, and an industry of this kind would be of great value to us. The farmers do not learn as quickly as some, but they learn well. The trouble is to find capital, and in hard times to find men who are willing to put in that capital; and now after we have made tests and satisfied the men who would put in capital that the beets would be produced in time to keep their mill going; they will not put in the capital in any other way.

I would like to ask you how great a distance can beets, yielding, say 12 per cent., be shipped to those factories, taking the ordinary rate of freight?

I cannot say how far they can be shipped. I know how far they are shipped, but the railroad, I believe, gives a 50-cent rate for forty miles to some of the Nebraska factories. I think that is the outside limit they have reached there.

Fifty cents a ton would be a profitable rate of freight; that is a cent a mile.

We figure on a radius of about eight miles for ordinary wagon delivery; but in most of the counties of this State you can cross two railroads in every eight miles.

In any co-operative enterprise of this kind the establishment of a factory in any one locality in this State—it would be a long time before that immediate locality could supply it?

There is an abundance of good land. It does not take over twenty thousand acres of good land to supply a beet factory. I think a number of these northern counties have plenty of good land to supply two or three beet factories, if they want to build them. If a beet factory is started at a given point, it gives every one within a radius of fifty miles a chance to ship their beets to this factory by rail.

In Henry County they have changed the contract and do not require the farmer to take stock, but require him to cultivate so many acres. I don't know the number of acres that are contracted for.

What per cent. does your contract call for?

Over 12 per cent. The Henry County contract is 12.

How much acreage do they require in Henry County?

About thirty thousand acres. They seem to be well satisfied with our county.

What is the usual price paid per ton for the cultivation by skilled labor?

From one dollar to one dollar and twenty-five cents. It started pretty low originally in California, with Chinese labor, but the American labor has driven the Chinese out. I think the last estimate I saw of contract was one dollar a ton.

Have the samples you have analyzed in the State been from sandy soils?

From all kinds of soils. I have asked people in the clay lands to test it, and in Martin County we had some this year, and we have repeatedly received beets from clay lands that were of good quality. We have asked people in certain localities to test on all kinds of land—with very startling results sometimes.

I see the Nebraska people, in sending out their circulars, discourage the use of sandy land. Is it not a fact that what we call our sugar-tree land is about the best land to use?

I think, taking it right through, that is about the best land you can have for beets or anything else.

This has been a good lesson to me that these gentlemen have given us, and I thank Prof. Smart and Prof. Stone for the very interesting lecture, and Prof. Huston, who is thoroughly posted in all the work of testing these things; and I feel that this meeting has been a very great step in the right direction to the people and to the farming interests of Indiana. I think we are under great obligations to them for the work, and I move that we, as citizens, and in the farming interests of the State of Indiana, and the general development of the State, extend a vote of thanks to Prof. Smart, Prof. Stone and Prof. Huston for their demonstration here to-night.

Motion seconded and carried.

I see you say fourteen tons are raised to the acre. Is that the minimum? I refer to the little card here.

That was a particular piece of ground that we have up in Starke County that we did some special work on, and the result there is the net yield on a given piece of ground. I don't follow always the reported yield in these places; they are often guesses, and sometimes the yield is measured instead of weighed; they have not enough scales in that State in some places. The average yield in this country ought not to be figured over eleven tons east of the Rocky Mountains.

Would it be safe to figure Indiana at eleven tons?

You can figure Indiana from six to twenty tons, according to the year.

If we could only raise six tons, and we get four dollars, and out of the $4 per ton we pay $2 for labor and hauling and transportation, we have only $2 left, which is $12 per acre, and the farmer would not be encouraged to raise beets.

I am talking about the lowest crop you are ever likely to get. The year that will give six tons of beets in Indiana would not produce six bushels of corn. At the same time a year that is running down to six tons is a disastrous year, and we have got to keep these things all in view. If you are raising hogs you have got to figure on the year the cholera will strike you. I have very good evidence of over twenty tons of good beets being produced on an acre in this State, and I think in a good year we ought to get above twelve tons. In a year when you could only raise six tons of beets to the acre, you would not raise anything else that would pay better.

I have heard that, in localities where they raise sugar beets, they have improved the farming in all other directions?

It had proven that wherever a factory was located the price of land in that locality raised from ten to fifteen dollars in that locality.

Wherever the proper cultivation has been followed, has the beet crop been very materially affected by drouth?

Yes, sir; a drouth coming in August that will injure corn, will injure beets. A drouth will reduce the yield, but will increase the sugar yield of the beet.

They are trying to get a factory in Fort Wayne, and I have been told by people there that capital can be secured if they can secure an acreage of beets large enough. They tell us it reduces the fertility of the land worse than corn. How is that?

The ratios are not just the same as corn, but I should say the crop, as far as food requirements for the crop are concerned, or fertilizers required for the land are very much increased, so that in the long run the available fertility of that ground is, I believe, not so much decreased by a beet crop as by a corn crop.

Have you tried fall plowing for the crop?

Yes; I prefer the fall plowing.

What assurance have you for seed for the coming spring?

We have our usual sources, and I can buy some more. Last year the seed was not in the United States. All beets should be planted by the 10th of May, and some of the best beets we have had in our own locality were planted the 4th day of May.

MORNING SESSION, 9:30 A. M.

JANUARY 5, 1898.

The President: I am requested to make the statement that efforts are being made to organize the Secretaries of local State Fairs of the State into one body. The matter is in the hands of Mr. Nowlin, who desires to communicate with all the Secretaries.

Under the head of unfinished business, we will now call for the reports of any committees that are ready to report.

To the Members of the Delegate State Board of Agriculture:

Gentlemen—Your committee to whom was referred the address of Governor Mount, and the subject made prominent therein, report the following resolutions and recommend their adoption by this Board, to wit:

Resolved, That we heartily approve of Governor Mount's suggestion to the effect that the children in the public schools of the State should be systematically instructed in such matters as pertain to country life. To this end, we are in favor of an amendment to the school laws of the State, by which instruction shall be given in such elementary sciences as pertain particularly to agriculture and household economy.

Resolved, That, until this change in the law can be secured, we suggest to officers of public schools the propriety of advising their teachers to give occasional oral lessons upon such topics in nature study as will have a tendency to interest students in agriculture, horticulture, economic entomology, the care of domestic animals and household economy.

Resolved, That we believe that the preparation and use of properly prepared leaflets upon subjects directly relating to agriculture, as suggested in the Governor's address, would prove to be of great interest to our children in public schools and of great value to the agricultural interests of the State.

Resolved, That we recommend that a committee of five be appointed by this Board to prepare and submit to the Board, at its next annual meeting, such recommendations as are, in their judgment, proper for the Board to make to the next Legislature as to expedient legislation looking toward the giving of practical agricultural instruction in the common schools of the State.

Resolved, That we earnestly request Dr. Smart, President of Purdue University, to prepare suitable leaflets upon the following subjects: Economic botany and nature study; economic entomology and horticulture; animal industry, including dairy; veterinary science, and household economy. And we urge upon teachers in the public schools the importance of this work.

Respectfully submitted,
MASON J. NIBLACK,
AARON JONES,
E. M. C. HOBBS,

On motion of Mr. Niblack, the above resolutions were unanimously adopted.

The chair appointed the following committee to prepare a memorial to the Legislature of 1899: Aaron Jones, J. A. Hedgecock, E. M. C. Hobbs, H. B. Howland and Wm. M. Blackstock.

RESOLUTION OFFERED BY E. M. C. HOBBS.

Resolved, That we recommend the Fairs through the State to encourage educational exhibits, such as named and classified woods, birds, insects, weeds and plants, and such other exhibits as will tend to arouse an interest in nature study.

Carried.

The address on "Economics in Agriculture," dealing as it does with the subject of Agricultural Instruction in Public Schools, is by permission of Governor Mount inserted here.

ECONOMICS IN AGRICULTURE.

ADDRESS OF GOVERNOR JAMES A. MOUNT.

[Delivered before the State Farmers' Institute at Springfield, Ill.]

A farmer, upon being told that I was to discuss economics, replied: "What has economics to do with farming?" Another farmer said they did not grow that crop in Indiana, the main crop being corn.

An old farmer in Montgomery County—"Uncle" David Enoch, as he was familiarly called—was asked to talk in a farm institute held in that county. He said: "When I purchased my first farm in this county, my neighbors twitted me for having bought what they denominated the 'poor farm.' It was true," said he, "that the farm had been poorly managed, and the soil had become impoverished, but I contrived to make enough money from this 'poor farm' to pay for 600 acres of much richer land in this county, and at the same time greatly improve the 'poor farm.'" Continuing, he said: "I grow clover abundantly, at all times keeping a large part of my farm in grass, this enabling me to engage in growing live stock sufficient to consume the products of my farm, and in addition a large amount of the crops grown by my neighbors who are so unwise as to prefer marketing the products of their farms on the wagon instead of in the fleece and on the hoof. I get profit in two ways when I feed stock: the profit on my stock and the enrichment of my farm. I grow clover for the same reason. I get the crop and at the same time improve my soil."

The old gentlemen said that chemists and college professors tell us that clover gets ammonia or nitrogen from the air, thereby adding fertility to the soil. "I would not recognize what these gentlemen call ammonia and nitrogen if I was to meet them in the road, but I do know that I have made money farming and my farm has become richer at the same time." I have quoted liberally from the speech of this honest and successful farmer, because I regard it as one of the best on farm economics I have ever heard.

It was my privilege to hear a successful German farmer of Spencer County, Indiana, discuss the question, "How to reclaim the worn-out clay-hills" of that county. In his discussion he reasoned from the causes that had impoverished the soil. He said a farmer of that county came to him for advice as to which method would be cheaper -to pull down his log stable and rebuild on a clean spot, or to clean out the same. This farmer had not, in many years, cleaned his stable, and could no longer cut out logs above the door to afford a means of ingress and egress for his horses. The speaker said that he offered, if agreeable, to clean out the stable and remove the refuse to his own farm. The offer was accepted cheerfully, and I need not say who profited the more by the bargain. .This story illustrates very clearly the wise and unwise methods, thrift and thriftlessness. It is estimated that the manure of domestic animals in New York is annually worth one hundred million dollars, and that one-half of this is lost every year by reason of neglect and bad management. Indiana and Illinois have more live stock than New York, and the methods of caring for animal manure in these States are still more prodigal. In order to convince yourselves of the truth of this statement, you have only to travel over any of our great grain-growing and stock-feeding States. Crops of corn are fed on hillsides along creeks and branches and on waste lots where all the plant-food taken from the soil in the growth of these crops is lost. You will also see heaps of manure around barns being fire-fanged and thus destroyed, and also leaching out and washing away. This reckless waste will, in the process of time, in reduced crops emphasize the lack of applying the principles of economics to farming. The East has its abandoned farms even now. An able New York committee in its report tells of impoverished soil and idle farms in that State. Abandoned land may also be found in the richer Middle States. Hundreds of thousands of acres are found in the Southern States, abandoned to the growth of sedge, sassafras, pine-brush and blackberries.

SCIENTIFIC MEN SOUND A NOTE OF WARNING.

Prof. Huston, State Chemist of Indiana, estimates the commercial value of nitrogen, phosphoric acid and potash in a bushel of wheat at a fraction over 26 cents, and in a bushel of corn at 20 cents. In 1897 we exported from the United States 189,000,000 bushels of corn, the value of plant-food in which was $37,800,000, and of wheat 150,000,000, containing plant food worth $39,000,000.

In the shipping of these two cereals we have lost in three elements of plant food, at their value in the market, the enormous sum of $76,000,000.

The same eminent chemist says, in the Indiana Agricultural Reports for 1893, at page 185, that five of the leading crops in Indiana, viz., corn, wheat, oats, timothy and clover, take from the soil phosphoric acid, potash and nitrogen worth $104,603,700, and that the cornstalks and wheat straws of an average crop remove $28,000,000 worth.

Thus it will be seen that in the growing of these five crops there is taken from the soil every year a quantity of plant food valued at $132,603,700. To be forewarned is to be forearmed.

PROFITS MEASURED BY YIELD.

The fertility of the soil in a large measure determines the yield of crop. The largest crops must be grown to insure the greatest profits. The cost of producing 60 bushels of corn on rich soil is no more than the production of 20 bushels on poor soil. There is no profit in ten bushels of wheat per acre, but there is a good profit in thirty bushels. This will suffice to emphasize the wise economy of constant care to enrich rather than impoverish the soil.

PROFITS MAY BE FURTHER AUGMENTED BY USE OF CROP.

Two farmers this year may grow on adjacent farms fifty bushels of corn to the acre. One farmer gathers the corn and hauls it to market. Having but few farm animals, he does not save the fodder. In the spring the stalks are broken down and burned. When this farmer balances his books, if he fails to note the loss to his farm in plant food thus destroyed, and pursues this reckless method, he will find at last, in failing crops, that "farming don't pay." The fault, however, is not in the farm, but in the farmer. His neighbor, on the other hand, utilizes the entire crop. He understands the science of feeding, he has watched the trend of the markets, is a judge of live stock, and is prepared to feed his stock in the manner to obtain the best results and to the kind of stock that will command the best prices. He will also display sound judgment in feeding the soil while he is fattening his stock. His methods make it possible for him to realize three times as much from his crop as the man who hauled it to market. The growing of corn and transporting it to market require brawn. The growing and feeding of live stock, accompanied by a study of markets, require brains. By the latter method, factors that make for success are multiplied and possibilities for larger gain are augmented. Work is necessary upon the farm, but the farmer who depends upon work alone will find farm life mere drudgery. More wise planning and skillful execution are needed.

Of the 80,000,000 acres of corn grown in 1897, 50,000,000 acres of the by-product, or fodder, were in a measure lost. If this waste had been properly cared for, its value as food for farm animals would have amounted to multiplied millions of dollars.

UNTHRIFTY METHODS.

The utter disregard of economic principles is alarmingly manifest in the methods of the average farmer. The wasteful modes of harvesting the corn crop, if pursued in any other business, would result in bankruptcy.

Our farmers could learn many valuable lessons, and carry home with them many helpful ideas, if they would take a trip through one of the large establishments in any of our great cities where animals are slaughtered and the carcasses transformed into products for the markets. It is a common saying about the pork-packing establishments that every part of a hog is utilized except his squeal. In the factories that supply dressed beef the same economy prevails. I here quote from the Ladies' Home Journal:

"The hide goes to the tanner, the hair and blood are utilized, the horns and hoofs are transformed into combs and buttons, the thigh-bones (worth $80 per ton) are cut into handles for clothes-brushes, the fore-leg bones sell for $30 per ton for collar buttons and parasol handles, the water in which the bones are boiled is rendered into glue. and the dust from sawing the bones is food for poultry."

In all these places the most careful business methods are rigidly exercised.

Not long ago a closely-observing man, who had traveled extensively in Indiana, said the waste on the farms in that State exceeded the net profits. Recently, at one of the farm institutes in our State, a gentleman who last fall traveled in Europe made the statement that the waste of Indiana farmers would keep the farmers in France.

As a result of my own travels through Indiana, I have become convinced that one million sheep could be kept during the summer months on the pastures and fields, utilizing what would otherwise be wasted and much of which, in the shape of weeds and brush, is positively hurtful to the farms. I am unable to manage any farm and obtain the largest returns without sheep.

It is no uncommon thing, in going about over the country, to find valuable farm machinery exposed to the weather. I once had a neighbor of whom it was said that he was never troubled to take his reaper out of the barn or shed. "All that he had to do was to cut the weeds from around it and hitch on." The rust and rot of winter do more for the implement dealer than all the wear and tear of summer.

A few years ago I addressed a farm institute on "The Possibilities of Better Profits in Farming." To this address an old farmer responded with much zeal. He said there were no longer any profits in farming. He said the farms were mortgaged for near their value; the mortgage notes bearing 8 per cent. interest, while the farmers could not make to exceed 2 per cent. on the value of their farms. It is only a question of time, he said, when the money lender, the trusts, the combines and the monopolies would dispossess the farmer. We are only hewers of wood and drawers of water for the monopolies of this country.

In a brief reply I asked this farmer if he carried this tale of woe into his home? If he thought that such a picture of farm life would be inspiring to his boys? I said to him frankly, if he could see nothing more hopeful than he had portrayed, he should cease to dishonor the noble vocation.

A young man came to me and thanked me for the reply I had made, saying that he boarded at that farmer's house, keeping his horse there, while he taught the winter school. He further said he got lumber and nails and enclosed a place where he could keep his horse from being molested by other stock. There was not a stable or barn-door on hinges; stock went at will through the barn; farm implements unsheltered, stock running over and damaging the same. Everything, he said, showed signs of neglect, unthrift and waste at home, while the farmer was in town, abusing laws and lawmakers, banks and capitalists, forgetting that his greatest enemy was his own unthrifty methods.

ECONOMY OF GOOD ROADS.

One of the greatest blessings to farm life is good thoroughfares. There is no burden more galling to the farmer's family than the thraldom of mud roads. Intellectual progress is trammeled, social development dwarfed and financial success retarded by bad roads. The farmer who sees teams plodding their weary way by his farm, through the mud, himself partakes of the surroundings; steps sluggish; thinks slowly; loses pride and becomes non-progressive. The farmer who sees a fine turn-out gliding swiftly along a good thoroughfare catches the inspiration, steps quicker, thinks more, and seeks to keep up with the spirit of progress. Good roads shorten the distance to market, enable the farmer to reach market at less cost; enables the farmer's family to go to town over good roads and in a carriage that does not humiliate their self-respect. They enable them to go to church, to entertainments and to keep in touch with the world. He gets his mail oftener; hence, has a stimulus to read. In short, good roads, like abundant harvests, scatter blessings upon all, city and country alike. That farmer displays the wisest economy who maintains the greatest liberality to road improvement; and he is a benefactor who improves the thoroughfares of his county.

MANY ECONOMIC QUESTIONS.

The law of supply and demand, and of consumption and production, lie at the foundation of markets and are the basic principles upon which the farmer must build for success. The science of feeding, and the effect of food upon product, are becoming more and more a problem to be solved.

Elements of plant food required by growing crops.

Plants that tend to improve soil conditions, and those that rapidly exhaust fertility.

Wise crop rotation.

Greater ability on the part of farmers to increase soil fertility, and to conserve and restore it when exhausted.

Maximum crops at minimum cost.

Less acres and better tillage—better utilization of all crops grown.

Less extensive farming and the adoption of more intensive methods.

Less marketing of coarse material, and more of finished products.

THE DEMANDS OF THE PRESENT.

I desire to devote considerable time to the consideration of a phase of this question in which I am deeply concerned.

The discontent manifested through the migration of country people to the cities is a cause of serious alarm. The rural population is losing yearly its ratio to the whole. The urban population is rapidly increasing. Churches and schools in the country districts are not so well attended.

Young people in the country do not see in farm life hopeful possibilities, and hence leave the farm, seeking broader fields for their ambition. It is to a correction of this narrow view of farm life, and to the equipment of the farmer for a larger measure of success that I am earnestly striving.

George Washington denominated farming as the most noble, the most useful and independent of all vocations. After he had led our armies to victory, and served two terms as President, he regarded it as no lowering of his dignity to return to his Virginia plantation.

The Sage of Monticello—the author of the Declaration of Independence—Thomas Jefferson, retired from the Presidency to the farm.

President Washington, in his annual message to Congress, December 7, 1796, recommended the establishment of a university in which, among other things, the science of agriculture should be taught.

"It will not be doubted," he said, "that with reference to either individual or national affairs, agriculture is of primary importance. In proportion as nations advance in population and other circumstances of maturity, this truth becomes more apparent and renders the cultivation of the soil more and more an object of public patronage. I have heretofore proposed to the consideration of Congress the expediency of establishing a National University and a Military Academy."

The Military Academy was established, but no place provided for giving instruction in the science that has given to us the sinews of war, created our commerce, and made us mighty in peace.

Thomas Jefferson also recommended the teaching of agriculture in the universities.

Horace Greeley, in answer to the question how to enrich worn-out land, said: "Fertilize with brains."

An English writer says: "Depression in agriculture is depression in brains."

The imperative need of the hour is that agriculture be accorded its place of honor, viz., the foundation upon which our wealth and commerce depends.

This noble vocation should no longer be regarded as mere drudgery, but in the light of a complex science, demanding careful research and intense study.

The power to command the forces in Nature's great laboratory requires skill of no low degree. The wisest economy will be displayed in qualifying and preparing men who in farming will be able to secure the best possible results. In defense of this position I desire to devote considerable time in presenting the results attained in this and other countries through the teaching of the science of farming, not only in agricultural colleges, but in normal and common schools as well.

ASSOCIATION FOR THE IMPROVEMENT OF THE CONDITION OF THE POOR.

In 1895 an association was formed in New York City for the improvement of the condition of the poor. Hon. Abram S. Hewitt was made chairman and William H. Tolman secretary of a committee. This committee was composed of distinguished philanthropists, among whom was Hon. William E. Dodge. They found that the congested condition of cities is caused largely by conditions in the rural districts, which give rise to migration to the cities. They determined, if possible, to solve this economic problem. They believed the lack of proper training in the science of agriculture, its neglect and lack of consideration were the causes lying at the bottom of the trouble. They appointed a committee for the encouragement and promotion of agriculture. This committee appointed Mr. Geo. T. Powell, director of a system of agricultural investigation. Mr. Powell, in his report to the committee, after examining into the depressed conditions of agriculture, the neglect of its proper study and the disposition to leave the farm, says:

"One of the great underlying causes for the discontentment that exists among farmers is the fact that, as a class, they have no special training or education for their business. One generation follows another, working from the same basis of experience mainly. The methods that gave success in the past fail to do so at present. The soil has been depleted over a wide range of territory. The active, energetic young men needed on the farm to develop better possibilities are leaving it, because they have but little education or training fitting them for the business, and, failing to achieve success in following the footsteps of their fathers, they seek other vocations." Continuing, he says: "One of the first steps to be taken to build up a more successful agriculture and a more prosperous rural population is to begin at the foundation, and in the public schools, attended by the farmer's and other rural children, teach some of the natural sciences, with their application to rural life. But a small per cent. of the pupils receive instruction beyond the primary schools, and many in the country leave school without ever having learned anything about even the plant and other life so intimately connected with their welfare."

At the close of a series of agricultural schools held in Westchester County in February and March last (or 1896), under the auspices of the committee for the promotion of agriculture, a course of lectures on nature-study was given in the district schools, and also in the high schools of the same county. In these lectures lessons on plant life and the relation of plants to the improvement of the soil were especially impressed. The wonderful power of clover to enrich the soil, and the importance of its culture and intelligent study, were clearly presented. At the close of some of these lectures in the school room some farmers who were present, and who were among the most interested listeners and learners, rose to their feet and expressed their approbation of this method of instructing their children, saying it was the first time in their lives they had learned how clover benefited the soil, and, if they could have had that instruction when they attended school, their farms would have been much better and they would have been more prosperous.

Lessons in the science of entomology were also given. Specimens of fruit were exhibited showing the effects of "coddling moth" upon the apple, accompanied by instruction on methods for its destruction.

The recent objection to the importation of American fruit into Germany emphasizes the necessity for instruction in entomology.

To encourage the study of plants the following offer was made: To each pupil of the schools visited who should make application for them, a half dozen strawberry plants were promised to be sent by mail, the pupils to plant and care for them, and study and write essays upon what they had learned about the plants during the school year. Many city scholars, noticing this offer in the papers, sent in requests for the plants, saying that, while they had no land in which to cultivate the strawberries, they would put them in boxes kept on roofs and in windows.

I have briefly referred to these offers to show the child-love for plants and nature-study. One boy writes from New York three months after he had received the plants: "I have several new plants from the runners. I am going to rent some land in the country and raise strawberries. Where can I purchase the plants?"

So abundant were the results of these experiments that at a special meeting of the committee for the promotion of agriculture in New York State, held December 2, 1896, it was resolved that a committee, consisting of Messrs. Hewitt, Powell and Tolman, be a committee of three, with power to draft a bill in co-operation with Senator Nixon, for extending the instruction of horticulture throughout the whole State, and, in addition, providing for agricultural instruction. This wise conclusion was reached after a most careful investigation as to the promotion of the best interests of all city and country people alike.

The New York Association for Improving the Condition of the Poor, in its report on agricultural conditions and needs, at page 36, makes the following forceful declaration:

"That there is a successful solution of this most distressing experience through which we are passing, in this most remarkable transition period, there is not the slightest doubt in my mind; that we can and shall enter upon a higher development in the agriculture of our country than we have ever known, I am equally confident. That there will be building up of millions of contented, prosperous and happy homes again upon soil that to-day is watered with tears, there are many evidences to believe.

"The blessed way of deliverance is to be through the pleasant pathway of greater knowledge, which has always brought its blessing to everything to which it has been well applied.

"There is a general recognition throughout civilized countries that agriculture, the basic foundation upon which the life of the people must always depend, is impaired. With this clear recognition to-day, the light and power of science are being turned on to help in its upbuilding, the attention of public educators is becoming aroused, and our institutions of learning, with their splendid equipments, are turning their attention more in the direction of building up an educated, trained and skillful class of men and women in agricultural knowledge, as they have heretofore done for other interests. These forces, with well-directed financial influence and a close study of economic questions, together with a broad and liberal policy of the government, will make a combination of forces that must evolve certain and valuable results."

AGRICULTURAL DEPRESSION IN IRELAND.—THE REMEDY.

The deplorable condition into which agriculture had declined in Ireland led to the appointment of a committee, composed of members of Parliament and the most noted men of that country, to inquire into the causes of the agricultural and industrial depression. The Hon. Horace Plunkett, M. P., was made chairman. This committee, known as the Recess Committee, made an exhaustive investigation of agricultural conditions in other European countries, and in August, 1896, submitted their report to the Rt. Hon. Gerald W. Balfour, M. P., Chief Secretary to the Lord Lieutenant of Ireland. The report says: "Hitherto but little interest has been aroused in Ireland in those economic problems for which this report suggests some solution." The report enumerates the different agricultural countries of Europe, and says: "The organization of the farming class follows in all these countries." These organizations all receive government aid and encouragement. Especially has this aid been made manifest in special awards by the state of premiums for largest yields, best stock, etc. The most marked manifestation of sound economic wisdom has been agricultural education extending from the State agricultural colleges and experiment stations down to the common schools. I think it opportune at this time for us to note the growing interest and improved methods of agriculture in the old world. Competition with American farmers, who had unlimited areas of rich soil, forced the farmers of the old world to adopt economic methods which, sooner or later, we ourselves shall be compelled to adopt. I shall quote extensively from this report, published in Dublin, Belfast and London in 1896. At pages 53, 54 and 55 we read:

MARVELOUS RESULTS FOLLOW AGRICULTURAL INSTRUCTION IN THE COMMON SCHOOLS.

"The most positive action of the State in assisting agriculture is taken in connection with education. Everywhere it is accepted as an axiom that technical knowledge and general enlightenment of the agricultural class are the most valuable of all levers of progress. The great sums spent by the various countries in promoting technical education as applied to agriculture, as well as to other industries, prove this. M. Marey-Oyens, the head of the Dutch Board of Commerce and Industry, the President of the Agricultural Council, says: 'Every guilder spent in the promotion of agricultural teaching brings back profit an hundredfold.' 'Every franc spent in agricultural teaching brings a brilliant return,' says the Belgian Minister of Agriculture in his message to Parliament last year. M. Tisserand attributes the great progress made by French agriculture since 1870, in a large measure 'to our schools, our professors, our experiment stations, and the illustrious men of science, whom the administration has induced to devote themselves to the study of agricultural questions.' Mr. H. M. Jenkins, in his report to the Royal Commission on Technical Instruction, says: 'The results of agricultural education in Denmark have been something extraordinary.' Danish butter is now the best in the world; in 1860 it was described by the British Vice-Consul at Copenhagen as 'execrably bad;' the progress since then is directly traceable to agricultural education.

"It will be unnecessary here to describe in detail the various systems of agricultural education adopted in the different countries. The most stirring point is the great similarity in the main features of these systems. Almost everywhere there is a course of elementary practical instruction in agriculture given in the primary schools; there is a class of secondary schools in which a more extensive course is given to boys of from thirteen to sixteen or seventeen; and there is a system of higher training for the sons of large land owners and those intended to be managers of large estates, agricultural engineers, and professors and teachers of agriculture. Most countries, however, have adopted a system of traveling instructors or professors, who not only superintend the agricultural courses given in the primary schools of their districts, but also hold conferences and give lectures, and advise, and keep themselves closely in touch with, the actual cultivators of the soil. Agricultural schools for the farmers' daughters, in which they are taught what is called in France the lore of the farm yard and farm house, including the rearing of poultry, the feeding and tending of live stock, cooking, domestic economy and the keeping of farm accounts, are also to be found now in most of these countries.

"Denmark has a staff of experts residing abroad to watch the interests of her staple agricultural exports and to advise the farmers as to the varying requirements of the market; and France has begun to appoint for a similar purpose Agricultural Attaches to her embassies."

Here we have presented the advantages of agricultural education. From page 143 I insert this brief note: "At the end of the last century Denmark was one of the poorest countries of Europe. To-day it is one of the richest, according to population, and that progress in wealth is almost entirely represented by its progress in agriculture." These facts are so interesting because they illustrate what seems to me to be the essential elements of agricultural progress in Denmark.

After enumerating state aid to agriculture through a system of prizes and maintaining of traveling experts in bacon-curing and dairy interests, on page 162 the report says:

"Besides these and other indirect ways of promoting agricultural education, technical instruction in agriculture is given in State primary schools, which are gratuitous and compulsory. The high schools, which now receive a government grant, include technical training in their curriculum; and there are special agricultural schools in which agriculture is the chief subject, receiving a subsidy from the State."

On page 172 we find the following:

"The elaborate system of State aid to agriculture which now exists in France is only the creation of recent times. Until the second Republic in 1848 no regular effort had been made by the State to establish agricultural education or any plan of general encouragement to agricultural industry."

From page 191 I make this extract:

AGRICULTURAL INSTRUCTION COMPULSORY.

"In addition to all these forms of instruction, a course of agricultural teaching is now obligatory in every Primary and Upper Primary school in the rural districts of France. There are 79,000 primary schools in France; of which 13,000 are voluntary with a nominal roll of 5,500,000 children; and of upper primary schools, which resemble the Model schools in Ireland, those are 160, with 14,700 pupils.

"Before making the agricultural course compulsory in these schools, the French government took a precaution which is worthy of special note, with the object of securing a supply of qualified teachers of that course. I have already pointed out that one of the duties of the departmental professors of agriculture is to give a course of instruction in agriculture to the teachers in training in the Normal schools of the departments. The government enacted, in 1879, that the agricultural course should not become obligatory in the primary schools until three years after the departmental professors had begun this teaching in the normal schools.

"The agricultural course in the primary schools is thus a thoroughly competent one, and its efficiency has been enhanced by a further wise resolution of the government—namely, to avoid fixing a uniform program for the various schools, and to leave it to the teachers themselves, subject only to the control of the departmental professors, to shape their own program in accordance with the agricultural character of their locality. The departmental professors constantly keep in touch with the primary schools and their teachers."

From the concluding portion of the report I quote the following:

"Such, in general outline, is the work done by the State and the associations of agriculturists in France to-day for the promotion of agricultural interests. As for the results which have been achieved, while it must be borne in mind that the full fruition of such work as this, in connection with an industry such as agriculture, can only come after a long lapse of time, the improvement already effected in the agricultural condition of France is, nevertheless, remarkable. On this head, I can do no better than quote a passage from Monsieur Tisserand's latest report on agricultural education: 'While the average annual production of corn during the ten years which preceded 1870 was 98,000,000 hectolitres, the annual average for the ten years from 1882 to 1892 was 107,210,000 hectolitres, representing a yearly gain for agriculture of at least 135,000,000 francs, notwithstanding the loss of Alsace-Lorraine.' "

The report makes this further extract from Monsieur Tisserand's report, which is very interesting:

"Monsieur Tisserand adds: 'Our schools now are far better attended than they used to be, everywhere people are working with zeal, and the scientific spirit has invaded the farm. Young men of intelligence are becoming more attached to rural life, and the children brought up in our country districts when they receive an appropriate agricultural education will be less tempted to go into the towns to increase the already too great number of those chronic unemployed who constitute to-day a perpetual danger to society."

HOLLAND, BAVARIA AND HUNGARY.

Holland also encourages agriculture and provides education along this line. On page 253 the report says of Belgium:

"The teaching of agriculture and horticulture has received great impulse since 1890, the government and the local authorities combining their efforts in this direction as the most powerful help to agriculture."

On page 254 we find this:

"It is gratifying to see what strides are made in every kind of agricultural instruction. Schools of agriculture and horticulture, dairy, rural housekeeping, have been multiplied, either supported or subsidized by the State. * * * All these means have powerfully tended to raise the intellectual standard of our people in the business of farming, and given such satisfactory results that the public authorities are determined to leave no stone unturned in this direction."

On page 306, the report, referring to Bavaria, says:

"Agricultural schools exist in every district, the state paying half the annual cost. They are of the simplest kind, intended for the sons of peasant farmers, and embracing a course of instruction in tillage, cattle-raising, arbor culture and market gardening."

With reference to Hungary, the report has the following, among other things, to say:

"In fine, the state spends 43,000 pounds a year on agricultural schools, which turn out yearly one thousand young men, well versed in scientific farming. There is a general desire on the part of the Hungarian government and people to multiply these schools and model forms, especially those of the less costly description, intended for the sons of peasants. Meantime the benefit derived from these schools is incalculable in a country like Hungary, where agriculture is the chief occupation of the people. 'The man,' says Swift, 'who makes two blades of grass grow where only one grew before is a benefactor to the nation'; and so impressed are Hungarian statesmen with this idea that their principal aim, since the recovery of their constitution in 1867, has been to raise the intellectual level of the farming classes, which they consider the best means for increasing the rural products of the kingdom."

IRELAND'S NEED.

The committee, in applying their investigations to conditions in Ireland, on page 88, make this appeal for industrial education:

"For the middle and upper classes of Ireland, speaking broadly, there are only three professions. A man has to make of his son either a lawyer, doctor or clergyman. The idea of treating as professions the callings of commerce, agriculture and manufactures, and of providing them with a special professional education, is not known here. Yet these three great professions stand at the head of the material interests of every country. They represent its productive forces, while the others, whatever their value otherwise, do not. They call for as wide and complex a variety of knowledge as any other profession, every branch of science is contributory to agriculture and manufactures. Our system of higher education in Ireland ought to aim in the future at raising these professions to their true place, and show our middle classes that these are the professional careers for their sons, besides those to which they have hitherto confined their ambition."

The foregoing emphasizes the economic wisdom of higher training for the profession of agriculture and manufactures, and shows their application to all countries.

OUR NEED.

Our dependence as a nation upon agriculture emphasizes the importance of a thorough knowledge of its science. As we magnify its importance, we invite to its pursuit. As we neglect its demands, we drive from its fields to the congested cities. When viewed a science, a profession, ambition sees possibilities for great achievements. When treated as drudgery, shorn of possibilities, its calling will be deserted. It is well to understand how to translate from the Greek and Latin roots into pure English, but it is of greater importance that our farmers understand the science of transposing, through plant roots the elements of the soil into abundant harvests and luscious fruits, thus supplying the wants of our people and commerce to the nation.

SOUND ECONOMY.

This principle is not circumscribed within such narrow bounds as to be applicable alone to the saving of money. The wise use of money is involved as well. Sound economic principles correctly applied will seek the promotion of agriculture, the elevation of farm life and the general betterment of the conditions surrounding our farmers. We must seek to improve the home, we must add conveniences and attractions. The social and intellectual standard must be advanced. Mind is the dominant factor of success on the farm.

We want fewer farmers who follow the signs of the moon, and more who are governed by science. We need more high-thinking and less chronic grumbling. We want more men who can see possibilities and till their farms in the sunlight of hope, and fewer growlers and grumblers. We want more farmers who can present their grievances in forceful argument fortified by truth and justice, and fewer who generalize their complaints and focus them on nothing in particular. We need more enthusiastic, wide-awake farmers to talk farming up, and fewer miserable failures to drag this noble vocation in the dust.

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

To the Members of the Indiana State and Delegate Boards of Agriculture:

Gentlemen—Your committee to whom was referred the President's address have carefully considered the different recommendations and suggestions made by him. We most heartily indorse his recommendation that particular attention and encouragement be given in educating the farmer's sons in the business of agricultural pursuits. We concur in what he says in regard to Farmers' Institutes, and we believe that every person interested in the promotion of agriculture, as well as the Indiana State Board of Agriculture, should do all in their power to make this work most effective and encourage the discussion of topics by local speakers.

The suggestions of the President as to erecting a large mechanical building and making other improvements on the fair grounds are timely and good, and meets with the hearty approval and approbation of your committee, and should be made as soon as the Board can see its way clear to raise the necessary funds.

While the committee believes that it would be well to own the land that it now leases, yet, under the conditions now existing, doubts the propriety of making such purchase at this time.

The most important suggestion made by the President and the one requiring the most careful and deliberate consideration by the Delegate Board is that which relates to surrendering our rights as a private corporation so as to become in fact as well as in name an institution of the State.

That his suggeston as to the method of accomplishing this, and the provisions of the proposed act, your committee believes to be right and prudent. Your committee would suggest, however, that so important a matter should be referred to a carefully selected committee, appointed by the President of this Delegate Board, whose duty it shall be to thoroughly investigate and take proper counsel and formulate a bill protecting the rights in full of the State Agricultural Society to present to the Legislature necessary to effect such a change; and such measures shall be reported to the Delegate Board of 1899 for consideration before presenting to the Legislature.

We approve the suggestion of the President, that the General Superintendent should be a member of the Board, and we recommend the adoption of a rule to that effect.

We do not agree with the President that the purchasing of stationery and other supplies used by the Board should be made exclusively by the President of the Board. But we do recommend that all such supplies should be purchased only upon the order and approval of the Executive Committee.

The recommendation regarding the issuing of complimentary tickets by the President alone does not meet with our full approval, but we do believe, and we hereby recommend that the issuing of such tickets ought to be done under the direction of the President and the Executive Committee, and by their approval alone.

It was as gratifying to the members of the State Board as it was to the President himself that their efforts met with such hearty co-operation from the citizens of Indianapolis, especially through the Board of Trade, the Commercial Club, the press and the traffic associations. To them we embrace this opportunity to express our obligations.

The President is justified in congratulating you upon the unusual success of the past fair, and we feel that a large part of this success is due to the active, earnest and intelligent labors of the President, Honorable Chas. B. Harris, who, with much sacrifice of time, devoted his energies to the work. We send him greeting in his journey to his foreign station, wishing him health, happiness and prosperity.

J. E. McDONALD,
CLAUDE MATTHEWS,
MORTIMER LEVERING,
CHARLES DOWNING,
Committee.

Motion of Mr. Howland, that the report be adopted.

DISCUSSION.

A Member: It seems to me that it would be the proper thing to purchase the ground that we now lease on the expiration of the present lease. It seems to me that I would be in favor of buying the land.

Mr. McDonald: Your committee went over the ground very carefully and concluded that the conditions at this time were not near so propitious for spending this money as when the land was leased. I do not think the committee should take upon itself the obligation of paying $40,000 for this piece of property. We will have to borrow the money. I do not see why this property was not bought when we had the money. We thought it was unfair to ask this Board to settle upon them a debt of $40,000 when it could be put off eighteen months before assuming the responsibility.

Mr. Howland: I do not think there is any risk to run in waiting, as this land can be purchased or re-leased at the expiration of the present lease, for seven years longer, or the Board has the option of purchasing the property at $300 per acre at any time.

Mr. Mitchell: I desire to call for a second reading of the part of the committee's report on the President's address referring to the transfer of the rights of the delegates and turn this whole organization over to the State. I do not think the delegates understood it.

(The paragraph referring to the transfer of the organization over to the State, to be a State institution hereafter instead of a private institution, was read by the Secretary.)

Mr. Mitchell: It seems to me that we are getting along very well under our present system.

Mr. Matthews: Allow me to interrupt you just a moment. In what way do you understand from the suggestion of this committee that the character of this Board is to be changed? There is nothing more in the President's address that is any change whatever in the condition of character of the Board or the formation of the Delegate Board from what it is. They are to be selected the same as they always have been. Every State in this Union has its State Board of Agriculture, which is distinctly and absolutely a State institution. This State stands alone in that respect—ours being called a private corporation. You do not want to become creatures of the Legislature? You are that to-day. There is not a legislative assembly that you do not have your committees appear and ask aid as a private corporation. As a State institution you would have the right to demand that aid, and if this State Board does not fare better as a State institution at the hands of the Legislature, I shall be very much surprised.

A Member: I simply rise to ask a question: Is it not much easier to give away a thing that you have than it is to take it back after you have given it away. (Laughter.)

Mr. Mitchell: If there is anything I like to do, it is for a man to understand what he is doing. I think we are getting along very well. Every county is represented if they hold a fair.

A Member: I know that agriculture is the foundation of the wealth of this country, and especially Indiana. Governor Mount has shown that very conclusively. And I do think that the tendency is against the people and in favor of the few, and that if this is made a State institution, the Board will be composed of professors and political men and not farmers. It is too much so now; I have seen it drifting in that direction. I believe that the farmers can manage a State or a county fair; that we do not necessarily need men who have not had personal experience on the farm to run it. I like such men as Governor Mount and ex-Governor Matthews, who have some experimental knowledge of farming interests, and if this is made a State institution I believe that it will be managed by men who are not agriculturists.

Mr. Jones: I desire that the Delegate Board understand fully the scope of the changes that are proposed. I discussed with President Harris the changes that are contemplated before he started for Japan, and stated to him the objections I could see to this procedure. And I desired to explain the matter so that every member of the Delegate Board may understand just what would be the effect. It is for that purpose, not that I desire to simply make an argument against the proposed plan, but so we may all fully and clearly know just what we are doing and understand the bill that will be presented to the Legislature that will convene here next winter, by which it is proposed that we surrender our rights as a private corporation and turn them over to the State of Indiana to become in fact a State institution. In the second paragraph of that address he says: "Reserving certain rights by which this Board may elect its members." If this is made a State institution, the Legislature will change that proposition at the very next session. I am not here to say that the next Legislature will be more unfriendly to the farmers of this State, but the matter is now in the hands of the farmers with a well adjusted system, and I am not in favor of surrendering our rights as a private corporation, but I want to be independent of any political party that may take possession of our State government.

Ex-Governor Matthews: I am very glad that the gentleman who has just addressed you told you what his position was on this question. Before he did so, I was at a loss to understand his remarks. I ask you who have been here for years, how many of you believed otherwise than that this was a State institution—absolutely a State institution—until you awoke one morning to find by the decision of the Supreme Court that you were a private corporation? How many of you believed otherwise than that? Not one of you. I want to read the recommendation of the committee:

> "The most important suggestion made by the President and the one requiring the most careful and deliberate consideration by the Delegate Board, is that which relates to surrendering our rights as a private corporation so as to become in fact as well as in name an institution of the State. That his suggestion as to the method of accomplishing this, and the provisions of the proposed act, your committee believes to be right and prudent. Your committee would suggest, however, that so important a matter should be referred to a carefully selected committee appointed by the President of this Delegate Board, whose duty it shall be to thoroughly investigate and take proper counsel to formulate a bill to present to the next legislature."

There is not a single man in all this audience that claims more loyal interest to the State of Indiana than I. There is not one man that would hesitate more than I in surrendering the rights that the farmers possess in this institution. We are asked to surrender nothing. We are simply asking you to protect your own rights and to do this through the committee. If this committee finds that in preparing a bill, that none can be prepared, that will protect your rights; that bill will never be submitted to the Legislature. You are not surrendering anything, as the matter is in your hands. The committee who shall formulate this bill will be members of this Delegate Board, and they will be men who will carefully guard the interests of this institution. I can say that there is no risk to run. If, however, there should be any doubt about the matter, there is no necessity requiring this committee to present a bill to the Legislature. I want to say to this Board that if this movement is going to act to the injury of the State Board of Agriculture and the Fair organization, I shall never consent that the bill shall go before the Legislature. We are now in a position that when we go to the Legislature for aid, their reply to us is that we are a private corporation. On the other hand, if this bill is presented to and passed by the Legislature, then you will be placed in the hands of the State, and will be in a position to demand the aid that you must now beg. Other organizations are making a fight against you. I have no reflections to make against the management of the State Board of Agriculture heretofore. It was composed of honorable gentlemen. I believe they were honest men. I believe that this Board is equally as honest and controlled by just as honest motives. I want to be in a position to go before the State and ask for the aid that we are justly entitled to, and not be forced to make excuses for the fact that this is a private corporation. By this plan you would elect the members of this Board just the same as you have done heretofore; you select the men you desire to represent you, and then if the delegates you send here do not fulfill their duty as they should, then this Delegate Board alone is responsible for the mistake. There is nothing removed from you, and if a bill cannot be formulated to follow such a course as will protect the interests of this institution and the agriculturists of the State, then I for one of the committee will see that that bill shall never be introduced to the Legislature.

Mr. Jones: Mr. President, I move to amend by striking out the following:

> "The most important suggestion made by the President and the one requiring the most careful and deliberate consideration by the Delegate Board, is that which relates to surrendering our rights as a private corporation so as to become in fact as well as in name an institution of the State. That his suggestion as to the method of accomplishing this, and the provisions of the proposed act, your committee believes to be right and prudent. Your committee would suggest, however, that so important a matter should be referred to a carefully selected committee appointed by the President of this Delegate Board, whose duty it shall be to thoroughly investigate and take proper counsel and formulate a bill to present to the legislature necessary to effect such a change."

Motion lost and report of committee adopted.

Committee to prepare bill: Claude Matthews, Charles Downing, Mortimer Levering and James E. McDonald.

The President: We have a paper sent to us by Governor Mount on the swine industry in Indiana, which I desire to have read to this convention.

Paper read by the Secretary.

THE SWINE INDUSTRY IN INDIANA.

The loss due to disease among swine since July 1. 1897, has been fully seventy per cent. less than for the corresponding period of last year, which means a saving to the State of at least $3,500,000. This estimate is made upon weekly reviews of the condition in all parts of the State.

The greater part of the gain may be credited to the unusually favorable conditions for the prevention of the swine plague, and possibly some credit is due to the influence of several hundred articles that appeared upon the subject as a result of the special investigation made last summer.

A brief summary of the report upon "The Swine Industry" is as follows:

The capital represented by the swine industry in this State is much larger than is generally supposed. Only three products of the farm—corn, wheat and horses, and the annual output of only one industry, the packing industry, have greater value. The capital represented is more than twice that represented by all the buggies and wagons manufactured in the State, two and a half times that of the glass, three and a half times that of the furniture, or four times that of the farm machinery. The loss to the industry last year was twice that of the total value of the coal mined or three times that of the stone quarried. The loss of wages caused by the coal strike last summer, which caused so much hardship and required public alms, was probably not as great as the loss from hog cholera in three or four of the principal counties.

Indiana ranks eighth as a State in point of valuation of her hog product; Iowa, Missouri, Illinois, Ohio, Kansas, Pennsylvania and Texas exceed her in the order named. The average number of hogs produced for the five years ending June 1, 1890, was 4,204,066, and for the three years ending June 1, 1897, 3,259,304, showing a very marked increase.

The greatest drawback to the industry in this State is hog cholera. The loss from this cause alone is greater than the annual output from several of our most important manufactories. For the year ending June 1, 1897, the losses by townships were as follows:

382 townships lost less than...............10 per cent.
217 townships lost between................10 and 20 per cent.
133 townships lost between................20 and 30 per cent.
111 townships lost between................30 and 40 per cent.
91 townships lost between................40 and 50 per cent.
56 townships lost between................50 and 60 per cent.
13 townships lost between................60 and 70 per cent.
1 township lost more than..............70 per cent.

The total loss was 899,457, one-fourth the entire product, valued at $5,396,742. A careful study of the distribution of the disease shows the rivers to be the principal carrier. The townships bordering upon the Wabash and north and south fork of the White river show a loss 50 per cent. greater than that in the second tier away and about 70 per cent. greater than those in the third tier. An example is as follows: In 1896 forty-four townships bordering upon the south fork of White river lost 32 per cent. of all the hogs, fifty-eight townships in the second tier lost 18 per cent., and forty-two townships in the third tier lost 14 per cent. These differences are uniform for several years and the disease always spreads away from the rivers. What is true of these larger rivers is also true of the smaller. A careful study was made of the water supply for stock during the past summer and it is evident no other detail in the industry needs improvement so much as this. Other stock, as a rule, are supplied with water of a fair degree of purity, but the hog is neglected. It is not an uncommon thing to see artificial ponds constructed to husband surface water for their supply, the most unfortunate thing that can be done. The escape from disease this year may be largely attributed to the fact that the drought was so severe and long that these sources were all exhausted. Disease was present until the drought set in and recurred again after it broke, in the section where the rainfall was sufficient to fill these holes.

A system of tests was made upon one hundred and thirty-eight "hog cholera cures" sold in this State. In all thirty-seven hundred pounds of medicine was used. Manufacturers donated the greater part and purchases were made of others. This task was too large to be completed in one year and it will be necessary to continue it for a short time next season before reporting the result. The investigation has shown that while there are a few honest efforts made to discover a cure, by far the greater number of "cures" are offered by misguided men who know nothing of the pathology of the disease, and charletans whose sole object is to make as much money as possible. There are many imitations of the government formula and duplicating patent medicines under new names. The tests have shown upon the whole the expense is out of all proportion to the benefit to be derived from their usage.

The law passed by the last session of the Legislature has had a most beneficial effect and has already saved the State thousands of dollars. The fair associations have generally obeyed its provisions by disinfecting the pens and requiring an affidavit of freedom from disease. Only five out of fifty-seven fairs failed to meet the requirements. The exhibitors have not reported contracting disease at Indiana fairs, but some who exhibited in a neighboring State where such precautions were not observed brought back the disease and suffered heavy loss. The law has also been observed at public sales and there has been more than usual care in disposing of the dead.

The full report discusses many minor problems, reviews the experiments now in progress in other places and makes a number of recommendations as to means of prevention.

The number of hogs on hand January 1, 1898, is probably fifteen per cent. greater than at the same time last year.

The motion of Mr. McDaniel, that the paper be printed in the annual report as a part of the proceedings of the meeting, prevailed.

The President: We will now hear the report of the Committee on Credentials.

	Delegate.
Angola Fair, Steuben Co. A. A.	Frank Macartney
Bloomington Fair, Monroe Co. A. and L. S. S.	Geo. W. McDaniel
Bainbridge Fair, Putnam Co. A. A.	J. C. Bridges
Bedford Fair, Bedford Fair and Trotting A.	Geo. W. McDaniel
Crawfordsville Fair, Montgomery Co. Union A. A.	Arch. Martin, Jr.
Chrisney Fair, Chrisney Fair (papers misplaced)	J. C. Haines

	Delegate.
Crown Point Fair, Lake Co. A. S.	A. A. Bibbler
Covington Fair, Fountain, Warren and Vermillion A. A.	Geo. W. Diffendorfer
Corydon Fair, Harrison Co. A. A.	Jas. W. McKinster
Charlestown Fair, Clark Co. Fair	V. K. Officer
Evansville Fair, Tri-State Fair	F. J. Sholz
Elwood Fair, Elwood Driving Park and Fair	D. G. Evans
Frankfort Fair, Clinton Co. A. S.	Jas. A. Hedgecock
Franklin Fair, Johnson Co. A. H. and P. Assn.	S. W. Dungan
Greenfield Fair, Hancock Co. A. A.	Charles Downing
Howlands Fair, Marion Co. Horticultural A.	C. C. Richards
Hagerstown Fair, Wayne Co. Fair Assn.	Knode Porter
Kentland Fair, Kentland Fair A.	Patrick Keefe
Kokomo Fair, Howard Co. A. A.	Jno. M. Leach
Kendallville Fair, Eastern Ind. A. S. (to act)	J. L. Dunning
Ligonier Fair, Noble Co. A. S.	J. L. Dunning
Lawrenceburg Fair, Lawrenceburg A. A.	H. L. Nowlin
Laporte Fair, Laporte A. A.	R. F. Small
Lafayette Fair, Tippecanoe Co. A. A.	W. M. Blackstock
Middletown Fair, Henry, Madison and Delaware	F. A. Wisehart
Madison Fair, Grange Jubilee and A. Ex. A.	D. P. Monroe
Marion Fair, Grant Co. A.	Joshua Strange
Muncie Fair, Delaware Co. A. and M. S.	M. S. Claypool
Madison Fair, Jefferson Co. A. A.	V. K. Officer
New Carlisle Fair, Farmers' Union Fair A.	I. N. Miller
North Vernon Fair, Jennings Co. Joint Stock A. S.	J. B. Smith
Newtown Fair, Richland Tp. L. S. and A. A.	Chas. R. McKinney
Newcastle Fair, Henry Co. Agri. Assn.	R. A. Smith
Princeton Fair, Gibson Co. H. and A. A.	Robt. Mitchell
Richmond Fair, Wayne Co. H. and A. Society	Jesse C. Stearns
Rushville Fair, Rush Co. Fair A.	M. M. Simms
South Bend Fair, Northern Ind. and So. Michigan	Aaron Jones
Swayzee Fair, Swayzee Tri-Co. Fair	G. W. McManiman
Salem Fair, Washington Co. Fair A.	W. W. Stevens
Shelbyville Fair, Shelby Co. J. Stock A. A.	Isom Wray
Sheridan Fair, Hamilton Co. A. A.	D. M. Hall
Vincennes Fair, Knox Co. A. and M. A.	Mason J. Niblack
Warren Fair, Warren Tri-Co. Fair	Sam'l C. Rousch
Winchester Fair, Randolph Co. Union A. S.	Wm. Fitzmaurice

Mr. Haines: Mr. President, I move that we now proceed with the election of members.

So ordered.

The President appointed A. A. Bibbler and H. F. Hulett to act as tellers.

There being but one candidate from the 1st district, it was moved and seconded that the Secretary be instructed to cast the votes of the entire convention for Mr. Haines for the 1st district, which was carried, and the Secretary accordingly cast 44 votes for Mr. Haines, and he was declared elected.

Hon. Mason J. Niblack, for the 2d district, received the vote of the entire convention and was declared elected.

Moved and seconded that the Secretary cast the entire 44 votes for Hon. W. W. Stevens, for the 3d district. Carried.

The President: The candidates for membership in the 4th district are J. W. Lagrange and E. A. Robinson, both of Johnson County. Proceed to collect the vote.

RESULT OF BALLOT.

Total number of votes cast	39
J. W. Lagrange received	19
E. A. Robinson received	20

Mr. Robinson was declared elected.

Mr. H. B. Howland, being the only candidate in the 7th district, it was moved and seconded that the Secretary cast the entire vote of the convention for Mr. Howland. So ordered, and he was declared elected.

In the 14th district there were two candidates—Mr. Cott Barnett and Mr. Joseph Cunningham. Out of a total of 39 votes, Mr. Barnett received 28 and Mr. Cunningham received 11 votes. Mr. Barnett, having received a majority of the vote cast, was declared elected.

There being but one candidate in the 15th district, it was moved and seconded that the Secretary be instructed to cast the entire vote of the convention for Mr. Aaron Jones. So ordered, and Mr. Jones was declared elected.

There being but one candidate in the 16th district, it was moved and seconded that the Secretary be instructed to cast the entire vote of the convention for Mr. J. E. McDonald. So ordered, and Mr. McDonald was declared elected.

Moved and seconded that the Secretary be instructed to cast the entire vote of the convention for Hon. Claude Matthews to fill the vacancy caused by the death of Mr. Sankey in the 9th district. Mr. Matthews was declared elected.

A Member: I move that a vote of thanks be extended to the Custodian, Mr. Vest, for the use of the Senate Chamber on the occasion of the lecture of Prof. Stone. So ordered.

REPORTS OF SUPERINTENDENTS AND LIST OF AWARDS.

REPORT OF SUPERINTENDENT OF ADMISSIONS.

As Superintendent of Gates, I would respectfully report that the system now adopted of requiring a coupon to be deposited by each person passing the gates works very satisfactorily and protects the Fair Association from any attempts to pass the gates unless the parties are clearly entitled.

I would recommend that at the street railway entrance that the fence on the east be extended east, giving more space for the accommodation of the public; and that the entrance gates be placed further east and opening to the north instead of east as now. This change will greatly accommodate the public, and can be effected with slight expense.

The cost of this department for the year 1897 was $889.

AARON JONES,
Superintendent.

REPORT OF SUPERINTENDENT OF GRAND STAND.

To the Indiana Delegates, State Board of Agriculture:

The expenses of the grand stand were:

For ticket receivers, police and janitors	$157.80
Total	$157.80

The total receipts of the grand stand amounted to $3,934.00, the largest amount by far in the history of the Association.

MASON J. NIBLACK,
Superintendent.

SPEED DEPARTMENT, 1897.

Mr. President and Members of the Delegate and the State Boards of Agriculture:

You may congratulate yourselves, and there is just cause for congratulation, that you had a speed department, the success of which has overshadowed all former efforts of this or any other association.

We gave twelve races, with purses aggregating $7,400.

We had 331 entries and it is an incontrovertable fact, a matter of history now, that we had the greatest list of entries, numbers and quality considered, ever gotten together at any race meeting.

We gave as a special "The Battle of the Kings," a race between the mighty and invincible "Star Pointer" and the equally great and much admired "Joe Patchen." We gained a world's record and a plethoric purse. However, they are both but passing pleasures in this department of the business.

We received from entry fees in purses	$5,237 50	
We received from deductions (5 per cent. from winners)	1,480 00	
We received from grand stand	5,662 65	
Total		$12,380 15
We paid in purses	$7,400 00	
We paid for special	2,000 00	
We paid for expense of department	326 80	
Total		9,726 80
Showing a net profit for the department of		$2,653 35
To this you may add the excess of gate receipts over regular receipts of former years		15,000 00
And you have a grand total gain of		$17,653 35

There are a few things affecting this department, directly and indirectly, that I desire to call your attention to. In the light harness department I would move the amphitheater to the south and make a show track for that department sufficient for all the requirements of the department. I would repair the stalls in the light and heavy horse department by making box stalls where partitions were torn out this season, which is an annual occurrence and an annual expense. I would not permit any exhibition of any kind to interfere with the speed programme. Interference of any kind invites adverse criticism and justly so.

There is another matter that would prove advantageous to the Board and be of much benefit to exhibitors and those in charge of exhibits. The connecting of the switches of the Lake Erie & Western Railroad and the Chicago, Indianapolis & Louisville Railroad across the north side of the grounds.

Everything connected with the department is in good condition, save those things damaged by the storm.

The following is the classified summary of the races:

TUESDAY, SEPTEMBER 14, 1897.

(All races two best in three.)

2:30 Trotters. Purse, $500.

Eckstein, bl. h., Axtel	1	1
Nobby, br. g., Cuckoo	2	2
Senator L., b. g., West Cloud	5	3
Gardenia, b. m., Candidate	3	6
Lentolus, b. g., Pactolus	4	7
Candy, b. m., Candidate	13	4
Dove Wing, b. m., Eaglite	10	5
Lady Clarissa	6	10
Tri-Color, c. g., Re-election	7	9
Manzanillo, b. m., Bonnie McGregor	8	8
Miss Logan, Buzmont	9	11
Bassador, Embassador	11	13
Streetor Boy, b. g	12	12
Allison Buzmont, b. h., Buzmont	14	14

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:34	1:09	1:42	2:16½
Second heat	:34	1:07¾	1:42	2:16¼

2:09 Pace. Purse, $700.

Palmyra Boy, bl. g., Gratton	1	1
Parker S., g. g., Temple Bar	2	2
Miss Williams, b. m., Williams	3	5
Sherman Clay, ch. g., Clay Dust	6	3
Ella T., g. m., Altamont	7	4
Brightlight, br. m., Dark Night	4	17
Capt. Crouch, c. h., Gen'l Smith	5	7

L. L. D., b. h., Woodford Wilkes	9	6
Judge Swing, br. h., Wilkes Boy	15	8
Ole Hutch, br. g., Crit Davis	8	16
Flossie Delaney, s. m., Anderson Wilkes	11	9
Col. Thornton, b. h., Onward	10	13
Bessie Bonehill, g. m., Empire Wilkes	17	10
Dick Wilkes, b. g., Young Wilkes	18	11
Milton S., b. h., Redwing	14	12
Cleveland S., b. h., Montgomery	12	15
Nydia Wilkes, b. m., Baron Wilkes	16	14
Pinewood, b. h., Anteros	18	18

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:30½	1:02	1:34½	2:07¼
Second heat	:30¾	1:02½	1:35½	2:08¼

2:20 Trot. Purse, $600.

Senator Wilkinson, br. h., Woodford Wilkes	1	1
Kitty L., br. m., Lancewood Chief	5	2
White Points, b. g., Mikegan	2	17
Harry H., b. g., Huron Boy	5	3
Alfro, g. h., Rounds Sprague	4	4
Hypolite, br. m., Alladin	15	5
Superior Wilkes, c. h., Hector Wilkes	6	9
Bowret Belle, bl. m., Baron Wilkes	16	6
Zylphia, b. m., Graystone	7	7
Red River, c. h., Hinder Wilkes	8	10
Snow Ball, b. g., Star Hambletonian	14	8
Silver Lake, bl. g., Lakewood	9	11
Preston, g. g., Ponce De Leon	10	15
Neva Wilkes, br. m., Brignolia Wilkes	11	18
Lady Madison, b. m., Madison Smith	13	12
Lucy Porter, br. m., Commodore Porter	12	16
Piloteer, g. h., Pilot Medium	18	13
Temple Wilkes, b. g., King Wilkes	20	14
Faultless	17	20
Silver Maid, b. m., Silvertail	19	19

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:32½	1:06¼	1:40	2:13½
Second heat	:33½	1:06¾	1:40	2:14¼

WEDNESDAY, SEPTEMBER 15, 1897.

2:25 Pace. Purse, $500.

Personetta, bl. m., Oneida	1	1
Quickley, b. g., Hummer	3	2
Rex Abdallah, b. h., Abdallah Bruce	2	5
Millwood, c. g., Votary	7	3
Teah, b. m., Wilkeswood	5	4
Panchion, b. m., Petoskey	4	8
Edward O., b. g., Junemant	10	6
Durango, c. g., Red Jacket	6	12
Annie Lee, br. m., Alfred G	8	7
Spanish, bl. h., Madrid	9	11
Russell Patchen, s. g., Bourbon Patchen	13	9
J. W. S., b. h., Almont Medium	11	10
Fanny Gardner, b. m., Edict	12	dr.
Besiege, b. g., Cecillian	dis.	

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:34½	1:08½	1:42	2:15¼
Second heat	:32½	1:07¼	1:42¾	2:16¼

2:12 Trot. Purse, $700.

Dick Hubbard, b. h., Allandorf	5	1	1
Fred B., br. g., Reveille	1	10	13
New Castle, b. g., Cornelian	2	3	3
Albnet, b. m., Ambassador	9	2	7
Russelmont, b. g., Lord Russell	11	14	2
Pat Watson, b. h., Silverplate	3	8	6
West Wilkes, br. g., Homan Wilkes	14	4	5
King Warlock, c. h., Warlock	12	7	4
Ben B., b. g., Rigwood	4	11	9
Janie Shelton, c. m., Ashland Wilkes	13	5	8
Caid, br. h., Highwood	7	6	12
Red Star, b. h., Red Wilkes	6	9	11
McW., b. h., Furgas McGregor	8	13	10
Geo. G., b. g., Ayer's Gift	10	12	14

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:32	1:04¼	1:37½	2:10¾
Second heat	:31¾	1:05	1:37½	2:09¾
Third heat	:32¾	1:05¼	1:38¼	2:10¾

2:17 Pace. Purse, $600.

Belle West, b. m., Double Strode	1	1
Light Star, c. g., Onega	6	2
Arline Wilkes, c. m., Hambletonian Wilkes	2	9
Knot Allen, b. h., Allendorf	3	8
Irax, b. g., Artillery	9	3
Sport, s. h., Black Diamond	4	4
Brown Pilot, br. h., Red Pilot	5	5
Uranus, b. g., Herschell	8	6
Redwood Redmon, c. h., Redmon C	7	12
Long Point, s. g., Hill Boy	16	7
Alpha	10	10
Al. West, Jr., b. g., Al. West	11	11
Alveo. b. g., Romeo Wilkes	12	13
Medium, b. g., Champion Medium	13	18
Silver Dick, g. g., Eric Jr	14	14
Fannie McGuire, c. m., Anderson Wilkes	15	16
Spalpeen, b. h., Hummer	17	15
Cassie Fletcher, s. m., Greystone	20	17
Replica, c. m., Repetition	18	19
Peter V., b. h., Longstrider	21	dis.
Billy W., b. g., Bald Weasel	19	dr.

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:30½	1:02¼	1:35¼	2:10¼
Second heat	:32	1:04½	1:37½	2:11¼

FRIDAY, SEPTEMBER 17, 1897.

2:14 Pacers. Purse, $600.

Brown Pilot, br. h., Red Pilot	1	1
Nora L., b. m., Jake	2	2
Fairview, Tyco	5	3
Namo, br. m., Great Heart	3	7
Light Star, c. g., Onega	4	5
Argetta, c. m., Greystone	12	4
Chestnut Boy, c. h., Pocahontas Sam	6	6
Mary A., b. m., Jay Eye See	7	13
Richard Wilkes, br. h., Billy Wilkes	10	8
Redino, b. m., Rewald	8	10
Prestoria Wilkes, c. m., Anderson Wilkes	11	9
Nellie K., r. m., Badger Jr	9	11
Wilkie Egbert, bl. g., King Egbert	13	12

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:32¾	1:05½	1:38½	2:10¾
Second heat	:32¼	1:04¾	1:37	2:10½

Kahlo, Hambrino, to beat 2:20. Purse, $10.

TIME.

¼ Mile.	½ Mile.	¾ Mile.	Mile.
:33½	1:07¼	1:40½	2:16½

2:25 Trot. Purse, $500.

Estella, b. f., Cecillian Prince	11	6	1	1
Eckstein, bl. g., Axtel	1	9	8	2
Dove Wing, b. m., Eaglite	13	1	11	3
Acts Tell, bl. m., Axtel	2	3	4	ro.
Nellie H., b. m., Strader's Hambletonian	8	2	3	ro.
Robert B., b. g., York Wilkes	5	7	2	ro.
Queen Almont, b. m., King Almont	3	8	5	ro.
Decision, b. g., Energy	12	4	13	ro.
Barbour's Thread, b. g	4	12	14	ro.
Lucy Porter, br. m., Commodore Porter	7	5	6	ro.
Mozette, b. m., Ashland Wilkes	6	10	10	ro.
Wight	9	11	7	ro.
Essie W., b. m., Wilkesdale	14	13	9	ro.
Peter Swift, b. g	10	16	12	ro.
Rustle, br. m., Lebanon Wilkes	15	14	15	ro.
Manzanillo, b. m., Bonnie McGregor	16	15	dr.	

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:35½	1:08¾	1:43¾	2:19¼
Second heat	:35	1:09¾	1:44¼	2:19¾
Third heat	:34¾	1:08½	1:43¼	2:19¼
Fourth heat	:34	1:08¾	1:43¼	2:19½

Free-for-all Pace. Purse, $800.

Guinette, b. h., Gambetta Wilkes	1	1
Pearl C., b. m., Sir Roy Wilkes	3	2
Bessie Bonehill, g. m., Empire Wilkes	2	3
Hail Cloud, br. h., Hershel	5	4
Choral, b. m., Crit Davis	4	5

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:31	1:02½	1:34½	2:07½
Second heat	:31¼	1:02¾	1:34½	2:06½

Battle of the Kings, Joe Patchen vs. Star Pointer. Purse, $3,000.

Star Pointer, b. h., Brown Hal	1	2	1
Joe Patchen, br. h., Patchen Wilkes	2	1	2

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:32	1:01½	1:33	2:04¾
Second heat	:32½	1:02¾	1:32¼	2:03
Third heat	:29¾	1:00	1:30	2:01

Note.—Third heat paced on September 18.

SATURDAY, SEPTEMBER 18, 1897.

2:16 Trot. Purse, $600.

Cura, b. g., Highwood	1	1
Black Seth, bl. g., Capt. Seth	3	2
Mackey, g. g., Wilton	2	4
Hans McGregor, c. g., Black Hawk McGregor	11	3
Georgia Simmons, b. m., George Simmons	4	7
Gratton Boy, b. h., Gratton	6	5
Wm. Tell, b. g., Cornelian	5	6
Jack Dawson, b. h., Director	7	16
Senator Wilkinson, br. h., Woodford Wilkes	8	9
Sunland Clay, br. h., Clay	15	8
Katrina Belle, bl. m., St. Bell	9	11
Espy Boy, bl. h., Civilian	10	14
Ackerland, c. g., Warlock	16	10
Asmond, br. h., Red Wilkes	12	13
Hypolite, br. m., Alladin	14	12
Mary Cossack, b. m., Don Cossack	13	15

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:33	1:06	1:39½	2:13¼
Second heat	:32¾	1:06½	1:40½	2:13½

2:21 Pace. Purse, $500.

Personnetta, bl. m., Onedia	13	9	1	1
Arlene Wilkes, c. m., Hambletonian Wilkes	9	1	2	2
Margery, br. m., Warfare	1	2	7	3
Indiana, b. g., King of Belgia	2	8	4	ro.
Little Pete, s. g, Peter V	3	3	6	ro.
Mollie Barnes	4	5	3	ro.
Ralston Boy, b. g., Ralston	5	4	5	ro.
Mango, c. h, Manager	6	6	8	ro.
Bacterid, b. g., Black Wilkes	8	7	9	ro.
Will-go, b. g., Red Jacket	7	10	dis.	
Dan Wilkes, c. g., Bourbon Wilkes	10	dis.		
Rex Abdallah, b. h., Abdallah Bruce	11	dis.		
Kahlo, br. h., Hambrino	12	dis.		

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:32	1:05½	1:37½	2:12¼
Second heat	:32	1:05¼	1:38½	2:11¾
Third heat	:32½	1:05¼	1:38	2:11¾
Fourth heat	:32½	1:05½	1:39½	2:16¼

Free-for-all Trot. Purse, $800.

Elloree, c. m., Axtel	6	1	1
Wm. Penn, br. h., Santa Claus	1	7	7
Senator A., g. h., Tramp Panic	2	2	2
Pray-tell, c. g., Axtel	3	3	5
Ky. Union, c. m., Aberdeen	5	5	3
Pilot Boy, g. g., Pilot Medium	7	4	4
Dandy Jim, g. g., Young Jim	4	6	6

TIME.

	¼ Mile.	½ Mile.	¾ Mile.	Mile.
First heat	:31	1:03¾	1:36¾	2:09¾
Second heat	:32½	1:05	1:38½	2:10½
Third heat	:32¼	1:04½	1:37¼	2:11½

OFFICERS OF THE COURSE.

O. P. Updegraph, Starting Judge.
George W. Hall, F. A. Bolser and W. W. Morgan, Judges.
Ed Sweeney and J. N. Dickerson, Timers.
J. W. Egnew, Clerk of Course.

Respectfully submitted,

M. S. CLAYPOOL,
Supt. of Department.

HEAVY DRAFT HORSES.

AWARDS.

CLASS I—French Draft and Percherons.

(W. F. Hazlet, Judge.)

STALLIONS.

4 years old and over, Robert Burgess & Son, Wenona, Ill	$20 00
Second, Leiter's Ford Imp. Co., Leiter's Ford, Ind	12 00
Third, L. M. Cochrane, Crawfordsville, Ind	7 00
3 to 4 years old, Robert Burgess & Son, Wenona, Ill	15 00
Second, Robert Burgess & Son, Wenona, Ill	10 00
Third, Leiter's Ford Imp. Co., Leiter's Ford, Ind	6 00
2 to 3 years old, Robert Burgess & Son, Wenona, Ill	12 00
Second, Huston & Son, Greenfield, Ind	8 00
Third, Robert Burgess & Son, Wenona, Ill	5 00
1 to 2 years old, Leiter's Ford Imp. Co., Leiter's Ford, Ind	10 00
Second, Robert Burgess & Son, Wenona, Ill	6 00

MARES.

4 years old and over, Leiter's Ford Imp. Co., Leiter's Ford, Ind	20 00
Second, Leiter's Ford Imp. Co., Leiter's Ford, Ind	12 00
Third, Leiter's Ford Imp. Co., Leiter's Ford, Ind	7 00
3 to 4 years old, Leiter's Ford Imp. Co., Leiter's Ford, Ind	15 00
Second Robert Burgess & Son, Wenona, Ill	10 00
2 to 3 years old, Robert Burgess & Son, Wenona, Ill	12 00
Stallion and four colts, Robert Burgess & Son, Wenona, Ill	**20 00**
Second Robert Burgess & Son, Wenona, Ill	15 00

CLASS II—Clydesdale and English Shires.

(W. F. Hazlet, Judge.)

STALLIONS.

4 years old and over, Robert Burgess & Son, Wenona, Ill	$20 00
Second, L. M. Cochrane, Crawfordsville, Ind	12 00
Third, W. T. Allen, Sr., Greenfield, Ind	7 00
3 to 4 years old, Robert Burgess & Son, Wenona, Ill	15 00

Second, L. M. Cochrane, Crawfordsville, Ind	$10 00
2 to 3 years old, J. F. White, Westfield, Ind	12 00
Second, J. F. White, Westfield, Ind	8 00
1 to 2 years old, Robert Burgess & Son, Wenona, Ill	10 00

MARES.

4 years old and over, Robert Burgess & Son, Wenona, Ill	20 00
Second, Robert Burgess & Son, Wenona, Ill	12 00
Third, J. F. White, Westfield, Ind	8 00
3 to 4 years old, Robert Burgess & Son, Wenona, Ill	15 00
Second, L. M. Cochrane, Crawfordsville, Ind	10 00
Third, L. M. Cochrane, Crawfordsville, Ind	6 00
2 to 3 years old, L. M. Cochrane, Crawfordsville, Ind	12 00
1 to 2 years old, L. M. Cochrane, Crawfordsville, Ind	10 00
Second, L. M. Cochrane, Crawfordsville, Ind	6 00
Colt, Robert Burgess & Son, Wenona, Ill	8 00
Second, J. F. White, Westfield, Ind	5 00
Stallion and four colts, Robert Burgess & Son, Wenona, Ill	20 00
Second, L. M. Cochrane, Crawfordsville, Ind	15 00

CLASS III—French and German Coach.

(W. F. Hazlet, Judge.)

STALLIONS.

4 years old and over, Lon Young, Crawfordsville, Ind	$20 00
Second, White River Tp. Coach Horse Co., Smith's Valley, Ind	12 00
Third, J. Crouch & Son, Lafayette, Ind	7 00
3 to 4 years old, J. Crouch & Son, Lafayette, Ind	15 00
Second, J. Crouch & Son, Lafayette, Ind	10 00
Third J. Crouch & Son, Lafayette, Ind	6 00
2 to 3 years old, J. Crouch & Son, Lafayette, Ind	12 00
Second, J. R. Bond, Cambridge City	8 00
Third, Ira J. Preston, London, Ind	5 00
1 to 2 years old, J. Crouch & Son, Lafayette, Ind	10 00
Second, J. Crouch & Son, Lafayette, Ind	6 00
Third, Ira J. Preston, London, Ind	4 00

MARES.

4 years old and over, J. Crouch & Son, Lafayette, Ind	20 00
Second, J. Crouch & Son, Lafayette, Ind	12 00
3 to 4 years old, Lon Young, Crawfordsville, Ind	15 00
2 to 3 years old, Lon Young, Crawfordsville, Ind	12 00
1 to 2 years old, Lon Young, Crawfordsville, Ind	10 00
Second, McCoy Bros	6 00
Stallion and four colts, Lon Young, Crawfordsville, Ind	20 00

CLASS IV—Cleveland Bay, Hackney and American Coach.

(W. F. Hazlet, Judge.)

STALLIONS.

4 years old and over, Robert Burgess & Son, Wenona, Ill	$20 00
Second, L. M. Cochrane, Crawfordsville, Ind	12 00
3 to 4 years old, Robert Burgess & Son, Wenona, Ill	15 00
Second, L. M. Cochrane, Crawfordsville, Ind	10 00
Third, McCoy Bros	6 00
2 to 3 years old, Robert Burgess & Son, Wenona, Ill	12 00
Second, A. C. Turner, Ross, Ohio	8 00
Third, Ira S. Doggett, Downeyville, Ind	5 00
1 to 2 years old, Robert Burgess & Son, Wenona, Ill	10 00
Second, L. M. Cochrane, Crawfordsville, Ind	6 00
Third, Robert Burgess & Son, Wenona, Ill	4 00
Colt, Robert Burgess & Son, Wenona, Ill	8 00
Second, Robert Burgess & Son, Wenona, Ill	5 00

MARES.

4 years old and over, Robert Burgess & Son, Wenona, Ill	20 00
Second, J. R. Peak & Son, Winchester, Ill	12 00
Third, Robert Burgess & Son, Wenona, Ill	7 00
3 to 4 years old, J. R. Peak & Son, Winchester, Ill	15 00
Second, J. R. Peak & Son, Winchester, Ill	10 00
Third, Furry & Son, New Palestine, Ind	6 00
2 to 3 years old, McCoy Bros	12 00
1 to 2 years old, J. R. Peak & Son, Winchester, Ills	10 00
Second, McCoy Bros	6 00
Colt, Robert Burgess & Son, Wenona, Ill	8 00
Stallions and four colts, Robert Burgess & Son, Wenona, Ill	20 00
Second, Robert Burgess & Son, Wenona, Ill	15 00
Third, McCoy Bros	10 00

Respectfully submitted.

J. W. LAGRANGE,
Superintendent.

REPORT OF LIGHT HARNESS HORSES, COACH AND CARRIAGE TEAMS, PONIES AND EQUIPAGES.

To the President and Delegate Board of Agriculture of the State of Indiana:

As your Superintendent of Light Harness Horses, Ponies, Coach and Carriage Teams, Roadsters and Saddlers for the Fair of 1897, would respectfully report that the entries in this department exceed any Fair since 1892, and more than double that of 1894 or 1895. In each class in this department there was a very creditable show, and in view of the fact that the premiums were reduced the show was fully up to my expectations and one that was creditable to any State Fair. There were some as fine individuals shown as the country affords.

Class Five (5), ninety-three entries, where there was some very warm competition; Class Six (6), with sixty-nine entries. In this class there were some as fine single and double roadsters as were ever shown at any State Fair. They were so evenly matched that they would baffle the most skillful judge. Many of these were worthy of special mention would time and space permit.

Class Seven (7), only sixteen entries. This being ponies it attracted considerable attention, especially among the ladies and children. Class Eight (8), with thirty-six entries of fine equipages. This class was well represented and had some very strong competition. This class of horses is always in demand, and if properly provided for and with proper diligence and management on the part of the Superintendent of this department there is no reason why this class should not always be well represented. The judge of this department, Mr. W. E. Cooley, of Crawfordsville, Ind., gave universal satisfaction. I would recommend that there be more box stalls made in the horse barns, as there are not sufficient numbers to supply the demand.

I would recommend the ground inside the show ring to be rolled and leveled up so as to make it suitable for driving on.

The total expense as shown by vouchers was $59.20.

AWARDS.

CLASS V—Light Harness Horses.

(W. E. Cooley, Judge.)

STALLIONS.

4 years old and over, J. R. Peak & Son, Winchester, Ill	$20 00
Second, A. C. Turner, Ross, Ohio	12 00
Third, L. M. Hubble, Indianapolis, Ind	7 00

3 to 4 years old, A. C. Turner, Ross, Ohio	$15 00
Second, J. N. Dickerson, Indianapolis, Ind	10 00
Third, J. R. Peak & Son, Winchester, Ill	6 00
2 to 3 years old, Ira S. Doggett, Downeyville, Ind	12 00
Second, A. C. Turner, Ross, Ohio	8 00
Third, A. C. Turner, Ross, Ohio	5 00
1 to 2 years old, J. R. Peak & Son, Winchester, Ill	10 00
Second, A. C. Turner, Ross, Ohio	6 00
Third, Robert Burgess & Son, Wenona, Ill	4 00
Colt, A. C. Turner, Ross, Ohio	8 00
Second, Jesse Fletcher, Indianapolis, Ind	5 00
Third, Minnie D. Clawson, Indianapolis, Ind	3 00

MARES.

4 years old and over, C. S. Rannells, Jacksonville, Ill	20 00
Second, J. R. Peak & Son, Winchester, Ill	12 00
Third, C. S. Rannells, Jacksonville, Ill	7 00
3 to 4 years old, James K. Hickok, Muncie, Ind	15 00
Second, Joe Barnes, New Salem, Ind	10 00
Third, F. E. Manker, Indianapolis, Ind	6 00
2 to 3 years old, A. C. Turner, Ross, Ohio	12 00
Second, Thomas Levi, Noblesville, Ind	8 00
Third, J. L. Tarlton, Lexington, Ky	5 00
1 to 2 years old, J. R. Peak & Son, Winchester, Ill	10 00
Second, J. F. Haneman, Indianapolis, Ind	6 00
Third, Jesse Fletcher, Indianapolis, Ind	4 00
Colt, A. C. Turner, Ross, Ohio	8 00
Second, Robert Burgess & Son, Wenona, Ill	5 00

GELDINGS.

4 years old and over, Lee Fort, Knightstown, Ind	20 00
Second, S. C. Curtis, Lafayette, Ind	12 00
Third, J. R. Bond, Cambridge City	7 00
3 to 4 years old, Robert Burgess & Son, Wenona, Ill	15 00
Second, W. P. Canfield, Haughville, Ind	10 00
Third, Jesse Fletcher, Indianapolis, Ind	8 00
Stallion and four colts, J. R. Peak & Son, Winchester, Ill	20 00
Second, A. C. Turner, Ross, Ohio	15 00

CLASS VI—Coach and Carriage Teams, Roadsters and Saddlers.

(W. E. Cooley, Judge.)

Coach or carriage teams, Horace Wood, Indianapolis, Ind	$30 00
Second, Robert Burgess & Son, Wenona, Ill	20 00
Third, Horace Wood, Indianapolis, Ind	10 00

Single roadster (mare), C. S. Rannells, Jacksonville, Ill	$30 00
Second, J. R. Peak & Son, Winchester, Ill	20 00
Third, C. S. Rannells, Jacksonville, Ill	10 00
Single roadster, gelding, S. C. Curtis, Lafayette, Ind	30 00
Second, J. R. Bond, Cambridge City, Ind	20 00
Third, Blair & Baker, Indianapolis, Ind	10 00
Double roadsters, C. S. Rannells, Jacksonville, Ill	30 00
Second, J. R. Peak & Son, Winchester, Ill	20 00
Third, S. C. Curtis, Lafayette, Ind	10 00
Saddle stallion, F. W. Spinning, Richmond, Ind	30 00
Second, John V. Connelly, Madison, Ind	20 00
Saddle mare, John V. Connelly, Madison, Ind	30 00
Second, Henry Taylor, Richmond, Ind	20 00
Third, T. C. Ruble, Franklin, Ind	10 00
Saddle gelding, Henry Taylor, Richmond, Ind	30 00
Second, Joe Barnes, New Salem, Ind	20 00
Third, J. Crouch & Son, Lafayette, Ind	10 00

CLASS VII—Ponies, All Breeds.

(W. E. Cooley, Judge.)

Pony, eleven hands high, single harness, Sylvester Johnson, Indianapolis, Ind.	$10 00
Second, Grace Christian, Indianapolis	5 00
Pony, eleven to thirteen hands, Horace Wood, Indianapolis	10 00
Second, Gertrude Spann, Indianapolis	5 00
Pony, thirteen to fourteen and one-half hands, E. H. Peed, Newcastle, Ind	10 00
Pair, eleven to thirteen hands, E. M. Brouse, Indianapolis	10 00
Second, Horace Wood, Indianapolis	5 00

CLASS VIII—Equipages.

(W. E. Cooley, Judge.)

Two-horse, two-seated, Horace Wood, Indianapolis	$20 00
Second, J. F. Burt, Indianapolis	15 00
Third, J. A. M. Wescott, Muncie, Ind	10 00
One-horse, one-seated (lady), George Koehne, Indianapolis	15 00
Second, Mrs. J. B. Newman, Indianapolis	12 00
Third, H. C. Sharpless, Indianapolis	7 00
One-horse, one-seated (gent.), C. S. Rannells, Jacksonville, Ill	15 00
Second, J. R. Peak & Son, Winchester, Ill	12 00
Third, Horace Wood, Indianapolis	7 00

Children's vehicle, Mrs. C. W. Meeker, Indianapolis	$15 00
Second, E. M. Brouse, Indianapolis	12 00
Third, Horace Wood, Indianapolis	7 00

Respectfully submitted,

JOHN C. HAINES,
Superintendent.

CATTLE—BEEF BREEDS.

Mr. President and Members of the Indiana State Board of Agriculture:

Gentlemen—I have the honor to submit my report on the exhibit of the beef cattle. In the number and especially the quality of the cattle exhibited at the State Fair for 1897 there was much cause for gratification, exhibitors coming from several States. The cattle of the various breeds exhibited were of high quality, well groomed and many possessing superior merit seldom met with in recent years on a show ground. The exhibitors entered into competition in the friendliest disposition, and the utmost good feeling prevailed during the Fair in this department. The following entries were made:

Shorthorns	46
Herefords	81
Polled Angus	31
Galloways	44
Red Polls	28
Total entries	230

The total expense of the department was $59.51, of which amount $41.75 was paid to Mr. I. N. Forbes, of Illinois, who was awarding judge, and $17.76 to Mr. Isaac Hupp, Assistant Superintendent.

I have no suggestions to offer, except such as should be properly made to the committee to arrange the premium list.

AWARDS.

CLASS IX—Short Horns and Polled Durhams.

(I. N. Forbes, Judge.)

BULLS.

3 years old and over, J. G. Robbins & Son, Horace, Ind	$15 00
2 to 3 years old, Aaron Barber, Avon, N. Y	10 00
Second, Van Meter Bros., Lexington, Ky	7 00

Third, Van Meter Bros., Lexington, Ky	$4 00
1 to 2 years old, Van Meter Bros., Lexington, Ky	8 00
Second, Van Meter Bros., Lexington, Ky	6 00
Calf, Aaron Barber, Avon, N. Y	5 00
Second, Van Meter Bros., Lexington, Ky	3 00

COWS AND HEIFERS.

3 years old and over, Aaron Barber, Avon, N. Y	$15 00
Second, J. G. Robbins & Sons, Horace, Ind	10 00
Third, J. G. Robbins & Sons, Horace Ind	5 00
2 to 3 years old, J. G. Robbins & Sons, Horace, Ind	10 00
Second, Aaron Barber, Avon, N. Y	7 00
Third, Aaron Barber, Avon, N. Y	4 00
1 to 2 years old, J. G. Robbins & Sons, Horace, Ind	8 00
Second, Aaron Barber, Avon, N. Y	6 00
Third, Aaron Barber, Avon, N. Y	3 00
Calf, Aaron Barber, Avon, N. Y	5 00
Second, J. G. Robbins & Sons, Horace, Ind	3 00
Third, Aaron Barber, Avon, N. Y	2 00
Four animals, get of one sire, Aaron Barber, Avon, N. Y	10 00
Second, Van Meter Bros., Lexington, Ky	7 00
Produce of one cow, Aaron Barber, Avon, N. Y	10 00
Second, J. G. Robbins & Sons, Horace, Ind	7 00
Third, Van Meter Bros., Lexington, Ky	4 00
Exhibitor's herd, J. G. Robbins & Sons, Horace, Ind	20 00
Second, Aaron Barber, Avon, N. Y	10 00
Breeder's herd, Aaron Barber, Avon, N. Y	20 00
Second, Van Meter Bros., Lexington, Ky	10 00
Best Bull, any age, J. G. Robbins & Sons, Horace, Ind	20 00
Best cow, any age, Aaron Barber, Avon, N. Y	20 00

CLASS X—Herefords.

(I. N. Forbes, Judge.)

BULLS.

3 years old and over, Harness & Graves, Bunker Hill, Ind	$15 00
Second, H. L. Leibfried, Emporia, Kas	10 00
2 to 3 years old, Harness & Graves, Bunker Hill, Ind	10 00
Second, H. L. Leibfried, Emporia, Kas	7 00
1 to 2 years old, Harness & Graves, Bunker Hill, Ind	8 00
Second, H. L. Leibfried, Emporia, Kas	6 00
Third, Thomas Clark, Beecher, Ill	3 00
Calf, H. L. Leibfried, Emporia, Kas	5 00
Second, H. L. Leibfried, Emporia, Kas	3 00
Third, Thomas Clark, Beecher, Ill	2 00

COWS AND HEIFERS.

3 years old and over, Thomas Clark, Beecher, Ill	$15 00
Second, H. L. Leibfried, Emporia, Kas	10 00
Third, H. L. Leibfried, Emporia, Kas	5 00
2 to 3 years old, H. L. Leibfried, Emporia, Kas	10 00
Second, Thomas Clark, Beecher, Ill	7 00
Third, Thomas Clark, Beecher, Ill	4 00
1 to 2 years old, Thomas Clark, Beecher, Ill	8 00
Second, Thomas Clark, Beecher, Ill	6 00
Third, H. L. Leibfried, Emporia, Kas	3 00
Calf, H. L. Leibfried, Emporia, Kas	5 00
Second, Thomas Clark, Beecher, Ill	3 00
Third, Thomas Clark, Beecher, Ill	[illegible]
Get of one sire, Thomas Clark, Beecher, Ill	10 00
Second, H. L. Leibfried, Emporia, Kas	7 00
Third, Thomas Clark, Beecher, Ill	4 00
Produce of cow, Thomas Clark, Beecher, Ill	10 00
Second, Harness & Graves, Bunker Hill, Ind	7 00
Third, Thomas Clark, Beecher, Ill	4 00
Exhibitor's herd, H. L. Leibfried, Emporia, Kas	20 00
Second, H. L. Leibfried, Emporia, Kas	10 00
Breeder's herd, Thomas Clark, Beecher, Ill	20 00
Second, H. L. Leibfried, Emporia, Kas	10 00
Best bull, any age, Harness & Graves, Bunker Hill, Ind	20 00
Best cow, any age, Thomas Clark, Beecher, Ill	20 00

CLASS XI—Polled Angus.

(I. N. Forbes, Judge.)

BULLS.

3 years old and over, Bradfute & Son, Cedarville, O	$15 00
2 to 3 years old, J. W. Reed, Oxford, Ind	10 00
1 to 2 years old, Bradfute & Son, Cedarville, O	8 00
Calf, Bradfute & Son, Cedarville, O	5 00

COWS AND HEIFERS.

3 years old and over, Bradfute & Son, Cedarville, O	$15 00
Second, Bradfute & Son, Cedarville, O	10 00
Third, J. W. Reed, Oxford, Ind	5 00
2 to 3 years old, Bradfute & Son, Cedarville, O	10 00
Second, Bradfute & Son, Cedarville, O	7 00
Third, J. W. Reed, Oxford, Ind	4 00
1 to 2 years old, Bradfute & Son, Cedarville, O	8 00

Second, Bradfute & Son, Cedarville, O	$6 00
Third, J. W. Reed, Oxford, Ind	3 00
Calf, Bradfute & Son, Cedarville, O	5 00
Second, J. W. Reed, Oxford, Ind	3 00
Third, Bradfute & Son, Cedarville, O	2 00
Get of sire, Bradfute & Son, Cedarville, O	10 00
Second, Bradfute & Son, Cedarville, O	7 00
Produce of cow, Bradfute & Son, Cedarville, O	10 00
Second, Bradfute & Son, Cedarville, O	7 00
Third, J. W. Reed, Oxford, Ind	4 00
Exhibitor's herd, Bradfute & Son, Cedarville, O	20 00
Second, J. W. Reed, Oxford, Ind	10 00
Breeder's herd, Bradfute & Son, Cedarville, O	20 00
Best bull, any age, Bradfute & Son, Cedarville, O	20 00
Best cow, any age, Bradfute & Son, Cedarville, O	20 00

CLASS XII—Galloways.

(I. N. Forbes, Judge.)

BULLS.

3 years old and over, Chapman Bros., South Rockwood, Mich	$15 00
Second, G. W. Gillman, Winchester, Ind	10 00
2 to 3 years old, Chapman Bros., South Rockwood, Mich	10 00
Second, G. W. Gillman, Winchester, Ind	7 00
Calf, Chapman Bros., South Rockwood, Mich	5 00
Second, Chapman Bros., South Rockwood, Mich	3 00

COWS AND HEIFERS.

3 years old and over, Chapman Bros., South Rockwood, Mich	$15 00
Second, G. W. Gillman, Winchester, Ind	10 00
Third, Chapman Bros., South Rockwood, Mich	5 00
2 to 3 years old, Chapman Bros., South Rockwood, Mich	10 00
Second, G. W. Gillman, Winchester, Ind	7 00
Third, Chapman Bros., South Rockwood, Mich	4 00
1 to 2 years old, Chapman Bros., South Rockwood, Mich	8 00
Second, Chapman Bros., South Rockwood, Mich	6 00
Third, G. W. Gillman, Winchester, Ind	3 00
Calf, G. W. Gillman, Winchester, Ind	5 00
Second, Chapman Bros., South Rockwood, Mich	3 00
Third, Chapman Bros., South Rockwood, Mich	8 00
Get of sire, Chapman Bros., South Rockwood, Mich	10 00
Second, G. W. Gillman, Winchester, Ind	7 00
Third, Chapman Bros., South Rockwood, Mich	4 00
Produce of cow, Chapman Bros., South Rockwood, Mich	10 00

Second, G. W. Gillman, Winchester, Ind.	$7 00
Third, Chapman Bros., South Rockwood, Mich.	4 00
Exhibitor's herd, Chapman Bros., South Rockwood, Mich.	20 00
Second, G. W. Gillman, Winchester, Ind.	10 00
Breeder's herd, Chapman Bros., South Rockwood, Mich.	20 00
Best bull, any age, Chapman Bros., South Rockwood, Mich.	20 00
Best cow, any age, Chapman Bros., South Rockwood, Mich.	20 00

CLASS XIII—Red Polls.

(I. N. Forbes, Judge.)

BULLS.

3 years old and over, Andrew Bros., Cedarville, O.	$15 00
2 to 3 years old, Andrew Bros., Cedarville, O.	10 00
1 to 2 years old, Andrew Bros., Cedarville, O.	8 00
Second, Andrew Bros., Cedarville, O.	6 00

COWS AND HEIFERS.

3 years old and over, Andrew Bros., Cedarville, O.	$15 00
Second, Andrew Bros., Cedarville, O.	10 00
2 to 3 years old, Andrew Bros., Cedarville, O.	10 00
1 to 2 years old, Andrew Bros., Cedarville, O.	8 00
Second, Andrew Bros., Cedarville, O.	6 00
Calf, Andrew Bros., Cedarville, O.	5 00
Second, Andrew Bros., Cedarville, O.	3 00
Get of sire, Andrew Bros., Cedarville, O.	10 00
Second, Andrew Bros., Cedarville, O.	7 00
Produce of cow, Andrew Bros., Cedarville, O.	10 00
Second, Andrew Bros., Cedarville, O.	7 00
Third, Andrew Bros., Cedarville, O.	4 00
Exhibitor's herd, Andrew Bros., Cedarville, O.	20 00
Second, Andrew Bros., Cedarville, O.	10 00
Breeder's herd, Andrew Bros., Cedarville, O.	20 00
Best bull, any age, Andrew Bros., Cedarville, O.	20 00
Best cow, any age, Andrew Bros., Cedarville, O.	20 00

Respectfully submitted,

CLAUDE MATTHEWS,
Superintendent.

CATTLE—DAIRY BREEDS.

To the President and Members of the Delegate Board of the Indiana State Board of Agriculture:

Gentlemen—In all departments a gratifying exhibit. The removal of the building from the woods into a prominent position assisted very materially in obtaining from the manufacturers of dairy implements the largest and most complete exhibit of dairy machinery and fixtures ever exhibited on the State Fair grounds in Indiana, requiring an additional tent 20x40 in order to accommodate the working dairy that was tried for the first time, and was in every way a success under the management and supervision of Professor Plumb and a corps of competent, practical, educated students of Purdue University, giving two exhibitions each day of the improved manner of testing cream and making butter, the interest in which never waned. The only difficulty was to accommodate those wishing to witness the operation. There were exhibited on the grounds in the Dairy Cattle Department thirty-seven head of Holstein cattle, all of the best that were exhibited in this country last year; twenty-four head of Ayrshires, which were a credit to the owner, and the finest exhibition of Jerseys, sixty-five in number, ever exhibited on any grounds at one time. There were also eighteen head of Guernseys that were a credit to any exhibitor or cattle exhibition. From these were procured the milk used for the most part in the working dairy, each cow being tested twice a day as to her merits, thus being an advantage to the owner as well as those interested in knowing just which breed of cattle was the best for dairy purposes. The cream separators were also tested with the percentage kept of cream left in the milk separated, which was of practical benefit to the parties wishing to purchase the best and most improved separator. This was eminently satisfactory to both the buyer and seller. As to the building, I would recommend an increase of space to be devoted to the working dairy in the form of an amphitheatre, so that it would be easy for every one present to see the practical work without obstruction or interruption, and instead of having two exhibitions a day, which was only a starter, make the exhibition continuous. This would necessitate an addition to the building now there, space 20x40 would be sufficient. As the permanent fixtures for hot and cold water were placed there this year the expense would be comparatively small. The entire expenses, including judges in the creamery and butter, was $128, and here let me say that the ice box was filled to its utmost capacity with butter and cheese directly under the supervision of Mr. Herman Beckman, to whom great credit is due and who we all know never fails to give general satisfaction. I have to return a vote of thanks to Professor Plumb, H. C. Beckman, John Strange and Charles Richards, all of whom rendered invaluable services in this department, and to whom the success of the Dairy Department, which was unparalleled this year, is largely due.

AWARDS.

CLASS XIV—Holstein-Friesians.

(Wm. H. Roberts, Judge.)

BULLS.

3 years old and over, Henry Stevens & Son, Lacoma, N. Y	$15 00
Second, W. H. Lagrange, Franklin, Ind	10 00
2 to 3 years old, Henry Stevens & Son, Lacoma, N. Y	8 00
Second, W. H. Lagrange, Franklin, Ind	6 00
Third, W. H. Lagrange, Franklin, Ind	3 00
Calf, Henry Stevens & Son, Lacoma, N. Y	5 00
Second, Henry Stevens & Son, Lacoma, N. Y	3 00
Third, W. H. Lagrange, Franklin, Ind	2 00

COWS AND HEIFERS.

3 years old and over, Henry Stevens & Son, Lacoma, N. Y	$15 00
Second, Henry Stevens & Son, Lacoma, N. Y	10 00
Third, Henry Stevens & Son, Lacoma, N. Y	5 00
2 to 3 years old, Henry Stevens & Son, Lacoma, N. Y	10 00
Second, Henry Stevens & Son, Lacoma, N. Y	7 00
Third, H. L. Leibfried, Emporia, Kas	4 00
1 to 2 years old, Henry Stevens & Son, Lacoma, N. Y	8 00
Second, W. H. Lagrange, Franklin, Ind	6 00
Third, W. H. Lagrange, Franklin, Ind	3 00
Calf, Henry Stevens & Son, Lacoma, N. Y	5 00
Second, Henry Stevens & Son, Lacoma, N. Y	3 00
Third, W. H. Lagrange, Franklin, Ind	2 00
Get of sire, Henry Stevens & Son, Lacoma, N. Y	10 00
Second, W. H. Lagrange, Franklin, Ind	7 00
Third, H. L. Leibfried, Emporia, Kas	4 00
Produce of cow, W. H. Lagrange, Franklin, Ind	10 00
Second, Henry Stevens & Son, Lacoma, N. Y	7 00
Third, H. L. Leibfried, Emporia, Kas	4 00
Exhibitor's herd, Henry Stevens & Son, Lacoma, N. Y	20 00
Second, W. H. Lagrange, Franklin, Ind	10 00
Breeder's herd, Henry Stevens & Son, Lacoma, N. Y	20 00
Second, W. H. Lagrange, Franklin, Ind	10 00
Best bull, any age, Henry Stevens & Son, Lacoma, N. Y	20 00
Best cow, any age, Henry Stevens & Son, Lacoma, N. Y	20 00

CLASS XV—Ayrshires.

(Wm. H. Roberts, Judge.)

BULLS.

3 years old and over, J. F. Converse & Co., Woodville, N. Y.	$15 00
Second, J. P. Beaty, Pataskala, O.	10 00
2 to 3 years old, J. F. Converse & Co., Woodville, N. Y.	10 00
Second, J. P. Beaty, Pataskala, O.	7 00
1 to 2 years old, J. F. Converse & Co., Woodville, N. Y.	8 00
Second, J. P. Beaty, Pataskala, O.	6 00
Calf, J. F. Converse & Co., Woodville, N. Y.	5 00
Second, J. P. Beaty, Pataskala, O.	3 00

COWS AND HEIFERS.

3 years old and over, J. P. Beaty, Pataskala, O.	$15 00
Second, J. F. Converse & Co., Woodville, N. Y.	10 00
Third, J. F. Converse & Co., Woodville, N. Y.	5 00
2 to 3 years old, J. P. Beaty, Pataskala, O.	10 00
Second, J. P. Beaty, Pataskala, O.	7 00
Third, J. F. Converse, Woodville, N. Y.	4 00
1 to 2 years old, J. P. Beaty, Pataskala, O	8 00
Second, J. P. Beaty, Pataskala, O.	6 00
Third, J. F. Converse & Co., Woodville, N. Y.	3 00
Calf, J. P. Beaty, Pataskala, O.	5 00
Second, J. F. Converse, Woodville, N. Y.	3 00
Third, J. P. Beaty, Pataskala, O.	2 00
Get of sire, J. P. Beaty, Pataskala, O.	10 00
Second, J. F. Converse & Co., Woodville, N. Y.	7 00
Produce of cow, J. P. Beaty, Pataskala, O.	10 00
Second, J. F. Converse, Woodville, N. Y.	7 00
Third, J. F. Converse, Woodville, N. Y.	4 00
Exhibitor's herd, J. P. Beaty, Pataskala, O.	20 00
Second, J. F. Converse, Woodville, N. Y.	20 00
Breeder's herd, J. P. Beaty, Pataskala, O.	20 00
Second, J. F. Converse, Woodville, N. Y.	10 00
Best bull, J. F. Converse, Woodville, N. Y.	20 00
Best cow, J. P. Beaty, Pataskala, O.	20 00

CLASS XVI—Jerseys.

(W. J. Wright, Judge.)

BULLS.

3 years old and over, J. E. Robbins, Greensburg, Ind.	$15 00
Second, H. G. Hallock, Columbus, Ind.	10 00
Third, Baum & Hill, Frankfort, Ind.	5 00

2 to 3 years old, J. E. Robbins, Greensburg, Ind	$10 00
Second, M. L. Hessong, Alliance, Ind	7 00
Third, H. G. Hallock, Columbus, Ind	4 00
1 to 2 years old, J. E. Robbins, Greensburg, Ind	8 00
Second, H. G. Hallock, Columbus, Ind	6 00
Third, H. G. Hallock, Columbus, Ind	3 00
Calf, M. L. Hessong, Alliance, Ind	5 00
Second, Peter Raab, Brightwood, Ind	3 00

COWS AND HEIFERS.

3 years old and over, Baum & Hill, Frankfort, Ind	$15 00
Second, J. E. Robbins, Greensburg, Ind	10 00
Third, H. G. Hallock, Columbus, Ind	5 00
2 to 3 years old, J. E. Robbins, Greensburg, Ind	10 00
Second, Baum & Hill, Frankfort, Ind	7 00
Third, H. G. Hallock, Columbus, Ind	4 00
1 to 2 years old, J. E. Robbins, Greensburg, Ind	8 00
Second, Baum & Hill, Frankfort, Ind	6 00
Third, H. G. Hallock, Columbus, Ind	3 00
Calf, H. G. Hallock, Columbus, Ind	5 00
Second, M. L. Hessong, Alliance, Ind	3 00
Third, J. E. Robbins, Greensburg, Ind	2 00
Get of sire, H. G. Hallock, Columbus, Ind	10 00
Second, J. E. Robbins, Greensburg, Ind	7 00
Third, M. L. Hessong, Alliance, Ind	4 00
Produce of cow, Baum & Hill, Frankfort, Ind	10 00
Second, M. L. Hessong, Alliance, Ind	7 00
Third, Peter Raab, Brightwood, Ind	4 00
Exhibitor's herd, J. E. Robbins, Greensburg, Ind	20 00
Second, Baum & Hill, Frankfort, Ind	10 00
Breeder's herd, H. G. Hallock, Columbus, Ind	20 00
Second, Peter Raab, Brightwood, Ind	20 00
Best bull, any age, J. E. Robbins, Greensburg, Ind	20 00
Best cow, any age, Baum & Hill, Frankfort, Ind	20 00

CLASS XVII—Guernseys.

(C. C. Richards, Judge.)

BULLS.

3 years old and over, Joe Defrees, Piqua, O	$15 00
Second, Edgerly & McCormick, Pataskala, O	10 00
2 to 3 years old, John Morgan, Plainfield, Ind	10 00
1 to 2 years old, Joe Defrees, Piqua, O	8 00
Second, Edgerly & McCormick, Pataskala, O	6 00
Calf, Joe Defrees, Piqua, O	5 00
Second, Edgerly & McCormick, Pataskala, O	3 00

COWS AND HEIFERS.

3 years old and over, Edgerly & McCormick, Pataskala, O	**$15 00**
Second, Joe Defrees, Piqua, O	**10 00**
2 to 3 years old, Joe Defrees, Piqua, O	**10 00**
Second. Edgerly & McCormick, Pataskala, O	**7 00**
1 to 2 years old, Joe Defrees, Piqua, O	**8 00**
Second, Edgerly & McCormick, Pataskala, O	**6 00**
Calf, Joe Defrees, Piqua, O	**5 00**
Second, Joe Defrees, Piqua, O	**3 00**
Third, Edgerly & McCormick, Pataskala, O	**2 00**
Get of sire, Joe Defrees, Piqua, O	**10 00**
Produce of cow, Joe Defrees, Piqua, O	**10 00**
Exhibitor's herd, Joe Defrees, Piqua, O	**20 00**
Second, McCormick, Pataskala, O	**10 00**
Best bull, any age, Joe Defrees, Piqua, O	**20 00**
Best cow, any age, Edgerly & McCormick, Pataskala, O	**20 00**

CLASS XXXIII—Dairy and Creamery Products.

(E. F. Doolittle, Judge.)

30 lbs. creamery butter, Robert W. Furnas, Indianapolis	**$20 00**
15 lbs. dairy butter, Wm. J. Hoadley, Ockley, Ind	**20 00**
5 lbs. dairy butter, J. S. Neff, Syracuse, Ind	**15 00**
Second, Wm. J. Hoadley, Ockley, Ind	**10 00**
5 lbs. dairy butter made by girl, Stella Atwood, Franklin, Ind	**15 00**
Second, Maggie A. Garretson, Pendleton, Ind	**10 00**
5 lbs. dairy butter by graduate dairy school, Wm. J. Hoadley, Ockley, Ind	**15 00**
Second, W. F. Smith, Thorntown, Ind	**10 00**
Full cream cheese, Boyd & Drischol, Cambridge City, Ind	**20 00**
Second, W. F. Smith, Thorntown, Ind	**10 00**

Respectfully submitted,

H. B. HOWLAND,
Superintendent.

REPORT OF SWINE DEPARTMENT.

The Swine Department in 1897 was certainly a gratifying success. The numbers were large and quality excellent. Exhibitors, as a rule, were well pleased.

During the wind and rainstorm on September 16, Barns Nos. 5 and 6 were blown down, and it seemed almost a miracle that no more damage was done. Two persons were slightly injured, and of the nearly two hundred animals in the pens only one was seriously hurt.

I do not think it necessary to rebuild these barns, but would suggest that the other barns be strengthened and bunks be built overhead, with places for storing feed. With all the pens available for swine any usual show can be easily accommodated.

It will be noticed that the expense of this department is larger than usual. This was caused by the fact that it was necessary to employ an extra man to see after cleaning and disinfecting the pens according to the new law. Then the Superintendent took an affidavit of every exhibitor in compliance with the new law. The reward for this is that not a sign of cholera appeared on the grounds and we have a reputation for doing our duty along that line.

There seems to be some question among exhibitors in regard to some of the special rules, and I hope they will be made more definite.

The waste pipes are not sufficient to carry off surplus water, and it is a regular mud hole about the show pens before the week is over. The floors of many pens are in bad condition, and I think a good plan would be to make floors entirely independent of the pens and then stand them on edge when not in use.

The troughs are useless and new ones should greet the 1898 Superintendent.

Following are the entries and expense of this department:

ENTRIES.

Class 27—Berkshires	151
Class 28—Poland Chinas	235
Class 29—Chester Whites and Victorias	196
Class 30—Duroc Jerseys	148
Class 31—Essex and Suffolk	67
Total	797

EXPENSE.

R. L. Bratton, Judge	**$14 05**
A. F. May, Judge	**25 75**
Elmer Ross, Assistant	**22 50**
R. L. Bostic, Assistant	**22 00**
Total	**$84 30**

AWARDS.

CLASS XXVII—Berkshire.

(R. S. Bratton, Judge.)

BOARS.

2 years old and over, A. S. Gilmore & Co., Greensburg, Ind	$12 00
Second, James Riley & Son, Thorntown, Ind	8 00
Third, John McQuiston, Franklin, Ind	4 00
1 to 2 years old, James Riley & Son, Thorntown, Ind	10 00
Second, J. F. Stover, Crawfordsville, Ind	7 00
Third, B. F. Dorsey & Sons, Perry, Ill	3 00
6 months to 1 year, James Riley & Son, Thorntown, Ind	8 00
Second, J. F. Stover, Crawfordsville, Ind	5 00
Third, James Riley & Son, Thorntown, Ind	2 00
Pig, James Riley & Son, Thorntown, Ind	8 00
Second, I. N. Barker & Son, Thorntown, Ind	5 00
Third, W. G. Riley, Thorntown, Ind	2 00

SOWS.

2 years old and over, James Riley & Son, Thorntown, Ind	$12 00
Second, John McQuiston, Franklin, Ind	8 00
Third, J. F. Stover, Crawfordsville, Ind	4 00
1 to 2 years old, J. F. Stover, Crawfordsville, Ind	10 00
Second, James Riley & Son, Thorntown, Ind	7 00
Third, John McQuiston, Franklin, Ind	3 00
6 months to 1 year, James Riley & Son, Thorntown, Ind	8 00
Second, J. F. Stover, Crawfordsville, Ind	5 00
Third, J. F. Stover, Crawfordsville, Ind	2 00
Under 6 months, James Riley & Son, Thorntown, Ind	8 00
Second, I. N. Barker & Son, Thorntown, Ind	5 00
Third, J. F. Stover, Crawfordsville, Ind	2 00

HERDS.

Aged herd, James Riley & Son, Thorntown, Ind	$20 00
Second, J. F. Stover, Crawfordsville, Ind	10 00
Young herd, James Riley & Son, Thorntown, Ind	15 00
Second, J. F. Stover, Crawfordsville, Ind	10 00
Get of boar, James Riley & Son, Thorntown, Ind	12 00
Second, W. G. Riley, Thorntown, Ind	8 00
Produce of sow, James Riley & Son, Thorntown, Ind	12 00
Second, Tavner Neal, Brownsburg, Ind	8 00
Pen of pigs, W. G. Riley, Thorntown, Ind	12 00
Second, I. N. Barker & Son, Thorntown, Ind	8 00
Best boar, James Riley & Son, Thorntown, Ind	20 00
Best sow, J. F. Stover, Crawfordsville, Ind	20 00

CLASS XXVIII—Poland China.

(R. L. Bratton, Judge.)

BOARS.

2 years old and over, B. F. Dorsey & Sons, Perry, Ill	$12 00
Second, S. D. Ghere, Thorntown, Ind	8 00
Third, Mints Bros., Mohawk, Ind	4 00
1 to 2 years old, W. O. Reveal, Indianapolis	10 00
Second, John McQuiston, Franklin, Ind	7 00
Third, Hendricks & Hess, Martinsville, Ind	3 00
6 months to 1 year old, S. D. Ghere, Thorntown, Ind	8 00
Second, John McQuiston, Franklin, Ind	5 00
Third, Mints Bros., Mohawk, Ind	2 00
Under 6 months, T. Lanahan, Edinburg, Ind	8 00
Second, W. O. Reveal, Indianapolis	5 00
Third, W. H. Hughes & Son, Brownsburg, Ind	2 00

SOWS.

2 years old and over, Wilkins & Son, New Lancaster, Ind	$12 00
Second, Lucian Arbuckle, Hope, Ind	8 00
Third, B. F. Dorsey, Perry, Ill	4 00
1 to 2 years old, B. F. Dorsey, Perry, Ill	10 00
Second, Hendricks & Hess, Martinsville, Ind	7 00
Third, John Ghere, Frankfort, Ind	3 00
6 months to 1 year, Wilkins & Son, New Lancaster, Ind	8 00
Second, Hendricks & Hess, Martinsville, Ind	5 00
Third, J. G. Allen, Millersville, Ind	2 00
Under 6 months, W. H. Hughes & Son, Brownsburg, Ind	8 00

Second, S. D. Ghere, Thorntown, Ind	$5 00
Third, Wilkins & Son, New Lancaster, Ind	2 00
Aged herd, Hendricks & Hess, Martinsville, Ind	20 00
Second, B. F. Dorsey & Sons, Perry, Ill	10 00
Young herd, S. D. Ghere, Thorntown, Ind	15 00
Second, Hendricks & Hess, Martinsville, Ind	10 00
Get of boar, Mints Bros., Mohawk, Ind	12 00
Second, Hendricks & Hess, Martinsville, Ind	8 00
Produce of sow, Mints Bros., Mohawk, Ind	12 00
Second, Hendricks & Hess, Martinsville, Ind	8 00
5 pigs, produce of sow, T. Lanahan, Edinburg, Ind	12 00
Second, W. O. Reveal, Indianapolis	8 00
Best boar, W. O. Reveal, Indianapolis	20 00
Best sow, Hendricks & Hess, Martinsville, Ind	20 00

CLASS XXIX—Chester White, Victoria, Cheshire and Large Yorkshire.

(Adam May, Judge.)

BOARS.

2 years old and over, Beeler & Son, Liberty, Ind	$12 00
Second, Stalcup & Son, Thorntown, Ind	8 00
Third, W. H. Lagrange, Franklin, Ind	4 00
1 to 2 years old, George Ineichen, Celina, O	10 00
Second, Dorsey Bros., Perry, Ill	7 00
Third, Wenzke Bro. & Co., Celina, O	3 00
6 months to 1 year old, Dorsey Bros., Perry, Ill	8 00
Second, E. A. Acre, Elsie, Mich	5 00
Third, George Ineichen, Celina, O	2 00

SOWS.

2 years old and over, W. H. Lagrange, Franklin, Ind	$12 00
Second, Beeler & Son, Liberty, Ind	8 00
Third, Dorsey Bros., Perry, Ill	4 00
1 to 2 years old, E. A. Acre, Elsie, Mich	10 00
Second, Stalcup & Son, Thorntown, Ind	7 00
Third, George Ineichen, Celina, Ohio	3 00
6 months to 1 year old, Dorsey Bros., Perry, Ill	8 00
Second, Beeler & Son, Liberty, Ind	5 00
Third, L. H. Martin, Alexandria, O	2 00
Under 6 months old, Beeler & Son, Liberty, Ind	8 00
Second, Milner & Son, Thorntown, Ind	5 00
Third, Wenzke Bro. & Co., Celina, O	2 00
Aged herd, E. A. Acre, Elsie, Mich	20 00

Second, Dorsey Bros., Perry, Ill	$10 00
Young herd, Dorsey Bros., Perry, Ill	15 00
Second, L. H. Martin, Alexandria, O	10 00
Get of boar, L. H. Martin, Alexandria, O	12 00
Second, Dorsey Bros., Perry, Ill	8 00
Produce of sow, L. H. Martin, Alexandria, O	12 00
Second, George Ineichen, Celina, O	8 00
Five pigs, produce of sow, Dorsey Bros., Perry, Ill	12 00
Second, Milner & Son, Thorntown, Ind	8 00
Best boar, Beeler & Son, Liberty, Ind	20 00
Best sow, E. A. Acre, Elsie, Mich	20 00

CLASS XXX—Duroc Jersey, Tamworth and Thin Rind.

(Adam May, Judge.)

BOARS.

2 years old and over, Geo. W. Stoner, Laplace, Ill	$12 00
Second, A. F. Schilder, New Palestine, Ind	8 00
Third, Clayton Bowerdaile, Camden, O	4 00
1 to 2 years old, Browning, Seekman & Co., Perry, Ill	10 00
Second, Clayton Bowerdaile, Camden, O	7 00
6 months to 1 year old, Browning, Seekman & Co., Perry, Ill	8 00
Second, Clayton Bowerdaile, Camden, O	5 00
Third, Clayton Bowerdaile, Camden, O	2 00
Under 6 months old, D. B. Brown, Castle, Ind	8 00
Second, A. F. Schilder, New Palestine, Ind	5 00
Third, D. B. Brown, Castle, Ind	2 00

SOWS.

2 years old and over, Clayton Bowerdaile, Camden, O	$12 00
Second, A. F. Schilder, New Palestine, Ind	8 00
Third, Seekman, Browning & Co., Perry, Ill	4 00
1 to 2 years old, Clayton Bowerdaile, Camden, O	10 00
Second, Geo. W. Stoner, Laplace, Ill	7 00
Third, Clayton Bowerdaile, Camden, O	3 00
6 months to 1 year old, Seekman, Browning & Co., Perry, Ill	8 00
Second, Clayton Bowerdaile, Camden, O	5 00
Third, Seekman, Browning & Co., Perry, Ill	2 00
Under 6 months old, D. B. Brown, Castle, Ind	8 00
Second, D. B. Brown, Castle, Ind	5 00
Third, Geo. W. Stoner, Laplace, Ill	2 00
Aged herd, Clayton Bowerdaile, Camden, O	20 00
Young herd, D. B. Brown, Castle, Ind	15 00

Second, Browning, Seekman & Co., Perry, Ill	10 00
Get of boar, D. B. Brown, Castle, Ind	12 00
Second, Seekman, Browning & Co., Perry, Ill	8 00
Produce of sow, D. B. Brown, Castle, Ind	12 00
Second, Clayton Bowerdaile, Camden, O	8 00
5 pigs, produce of sow, D. B. Brown, Castle, Ind	12 00
Second, Clayton Bowerdaile, Camden, O	8 00
Best boar, George W. Stoner, Laplace, Ill	20 00
Best sow, Clayton Bowerdaile, Camden, O	20 00

CLASS XXXI—Essex, Suffolk and Small Yorkshires.

(Adam May, Judge.)

BOARS.

2 years old and over, Bascom & McMurry, California, Mich	$6 00
Second, A. C. Green, Winchester, Ind	4 00
Second, A. C. Green, Winchester, Ind	3 00
6 months to 1 year old, Bascom & McMurry, California, Mich	4 00
Second, Bascom & McMurry, California, Mich	3 00
Third, A. C. Green, Winchester, Ind	2 00
Under six months old, Bascom & McMurry, California, Mich	4 00
Third, A. C. Green, Winchester, Ind	3 00
Third, Bascom & McMurry, California, Mich	2 00

SOWS.

2 years old and over, Bascom & McMurry, California, Mich	$6 00
Second, Bascom & McMurry, California, Mich	4 00
Third, A. C. Green, Winchester, Ind	2 00
1 to 2 years old, Bascom & McMurry, California, Mich	5 00
Second, Bascom & McMurry, California, Mich	3 00
Third, A. C. Green, Winchester, Ind	2 00
6 months to 1 year old, A. C. Green, Winchester, Ind	4 00
Second, Bascom & McMurry, California, Mich	3 00
Third, A. C. Green, Winchester, Ind	2 00
Under six months old, Bascom & McMurry, California, Mich	4 00
Second, Bascom & McMurry, California, Mich	3 00
Third, Bascom & McMurry, California, Mich	2 00
Aged herd, Bascom & McMurry, California, Mich	10 00
Second, A. C. Green, Winchester, Ind	5 00
Young herd, Bascom & McMurry, California, Mich	8 00
Second, A. C. Green, Winchester, Ind	5 00
Get of boar, Bascom & McMurry, California, Mich	6 00
Second, A. C. Green, Winchester, Ind	4 00

Produce of sow, Bascom & McMurry, California, Mich	6 00
Second, A. C. Green, Winchester, Ind	4 00
5 pigs, produce of sow, Bascom & McMurry, California, Mich	6 00
Second, A. C. Green, Winchester, Ind	4 00
Best boar, Bascom & McMurry, California, Mich	10 00
Best sow, A. C. Green, Winchester, Ind	10 00

Respectfully submitted,

H. L. NOWLIN.
Superintendent.

REPORT OF SHEEP DEPARTMENT.

Mr. President and Gentlemen of the Delegate Board:

As Superintendent of the Sheep Department for the Fair of 1897, I have to report a very greatly increased interest in this Department over recent years. Our classification, while far from perfect, is being improved along the right lines. The increased encouragement given the breeders and amateurs, in the way of the third prize in classes and flock and breeders' rings, has met the approval of all exhibitors.

Owing to the increased interest being taken in the Delaine Merinos, we recommend that this breed be given a separate class, with about one-half the regular cash prize offered. We also recommend that the offices in this Department be provided with lavatory and water-closet facilities. The actual exhibit in this Department was:

ENTRIES.

Class 18—Cotswolds	47
Class 19—Southdowns	59
Class 20—Shropshires	74
Class 21—Oxforddown	52
Class 22—Hampshire Downs	20
Class 23—Merinos	83
Class 24—Rambouillet	28
Class 25—Tunis	25
Class 26—Cheviots	17
Total	405

The expenses of this Department were $85.

AWARDS.

CLASS XVIII—Cotswold.

(S. H. Todd, Judge.)

RAMS.

2 years old and over, Wilson Bros., Muncie, Ind	$10 00
Second, Wilson Bros., Muncie, Ind	6 00
Third, Uriah Privett & Co., Greensburg, Ind	4 00
1 to 2 years old, Uriah Privett & Co., Greensburg, Ind	10 00
Second, Wilson Bros., Muncie, Ind	6 00
Third, Wilson Bros., Muncie, Ind	4 00
Lamb, Hal J. Woodford, Muncie, Ind	10 00
Second, Hal J. Woodford, Muncie, Ind	6 00
Third, Wilson Bros., Muncie, Ind	4 00

EWES.

2 years old and over, Wilson Bros., Muncie, Ind	$10 00
Second, Wilson Bros., Muncie, Ind	6 00
Third, Uriah Privett & Co., Greensburg, Ind	4 00
1 to 2 years old, Wilson Bros., Muncie, Ind	10 00
Second, Uriah Privett & Co., Greensburg, Ind	6 00
Third, Uriah Privett & Co., Greensburg, Ind	4 00
Lamb, Wilson Bros., Muncie, Ind	10 00
Second, Wilson Bros., Muncie, Ind	6 00
Third, Hal J. Woodford, Muncie, Ind	4 00

FLOCKS.

Aged flock, Wilson Bros., Muncie, Ind	$10 00
Second, Wilson Bros., Muncie, Ind	6 00
Young flocks, Hal J. Woodford, Muncie, Ind	10 00
Second, Wilson Bros., Muncie, Ind	6 00
Best ram, Wilson Bros., Muncie, Ind	10 00
Best ewe, Wilson Bros., Muncie, Ind	10 00

American Cotswolds, Record Special.

Aged flock, Wilson Bros., Muncie, Ind	$10 00
Second, Wilson Bros., Muncie, Ind	5 00
Young flocks, Hal J. Woodford, Muncie, Ind	10 00
Second, Wilson Bros., Muncie, Ind	5 00

CLASS XIX—Southdowns.

(S. H. Todd, Judge.)

RAMS.

2 years old and over, George McKerrow, Sussex, Wis	$10 00
Second, Sid Conger, Flat Rock, Ind	6 00
Third, George McKerrow, Sussex, Wis	4 00
1 to 2 years old, George Allen, Allerton, Ill	10 00
Second, George McKerrow, Sussex, Wis	6 00
Third, George McKerrow, Sussex, Wis	4 00
Lamb, George McKerrow, Sussex, Wis	10 00
Second, George Allen, Allerton, Ill	6 00
Third, George McKerrow, Sussex, Wis	4 00

EWES.

2 years old and over, George McKerrow, Sussex, Wis	$10 00
Second, George Allen, Allerton, Ill	6 00
Third, George McKerrow, Sussex, Wis	4 00
1 to 2 years old, George Allen, Allerton, Ill	10 00
Second, George McKerrow, Sussex, Wis	6 00
Third, Uriah Privett & Co., Greensburg, Ind	4 00
Lamb, George McKerrow, Sussex, Wis	10 00
Second, Uriah Privett & Co., Greensburg, Ind	6 00
Third, George McKerrow, Sussex, Wis	4 00
Aged flock, Uriah Privett & Co., Greensburg, Ind	10 00
Second, Sid Conger, Flat Rock, Ind	6 00
Third, Watt Wilson & Son, Muncie, Ind	2 00
Young flocks, Uriah Privett & Son, Greensburg, Ind	10 00
Second, George Allen, Allerton, Ill	6 00
Third, Watt Wilson & Son, Muncie, Ind	2 00
Best ram, George McKerrow, Sussex, Wis	10 00
Best ewe, George Allen, Allerton, Ill	10 00

CLASS XX—Shropshires.

(S. H. Todd, Judge.)

RAMS.

2 years old and over, George Allen, Allerton, Ill	$10 00
Second, Furry & Son, New Palestine, Ind	6 00
Third, George Allen, Allerton, Ill	4 00
1 to 2 years old, George Allen, Allerton, Ill	10 00
Second, George Allen, Allerton, Ill	6 00

Third, George Allen, Allerton, Ill	4 00
Lambs, S. H. Todd, Indianapolis	10 00
Second, George Allen, Allerton, Ill	6 00
Third, S H. Todd, Indianapolis	4 00

EWES.

2 years old and over, George Allen, Allerton, Ill	$10 00
Second, George Allen, Allerton, Ill	6 00
Third, George Allen, Allerton, Ill	4 00
1 to 2 years old, George Allen, Allerton, Ill	10 00
Second, George Allen, Allerton, Ill	6 00
Third, George Allen, Allerton, Ill	4 00
Lamb, S. H. Todd, Indianapolis	10 00
Second, George Allen, Allerton, Ill	6 00
Third, S. H. Todd, Indianapolis	4 00
Aged flock, George Allen, Allerton, Ill	10 00
Second, George Allen, Allerton, Ill	6 00
Third, Furry & Son, New Palestine, Ind	2 00
Young flocks, S. H. Todd, Indianapolis	10 00
Second, George Allen, Allerton, Ill	6 00
Third, W. H. Thorvburgh, Gilman, Ind	2 00
Best ram, George Allen, Allerton, Ill	10 00
Best ewe, George Allen, Allerton, Ill	10 00

CLASS XXI—Oxforddown.

(S. H. Todd, Judge.)

RAMS.

2 years old and over, George McKerrow, Sussex, Wis	$10 00
Second, George McKerrow, Sussex, Wis	6 00
Third, Sid Conger, Flat Rock, Ind	4 00
1 to 2 years old, George McKerrow, Sussex, Wis	10 00
Second, J. C. Williamson, Xenia, Ohio	6 00
Third, George McKerrow, Sussex, Wis	4 00
Lamb, George McKerrow, Sussex, Wis	10 00
Second, J. C Williamson, Xenia, Ohio	6 00
Third, George McKerrow, Sussex, Wis	4 00

EWES.

2 years old and over, George McKerrow, Sussex, Wis	$10 00
Second, Uriah Privett & Co., Greensburg, Ind	6 00
Third, J. C. Williamson, Xenia, Ohio	4 00
1 to 2 years old, J. C. Williamson, Xenia, Ohio	10 00

Second, George McKerrow, Sussex, Wis	6 00
Third, George McKerrow, Sussex, Wis	4 00
Lamb, George McKerrow, Sussex, Wis	10 00
Second, J. C. Williamson, Xenia, Ohio	6 00
Third, George McKerrow, Sussex, Wis	4 00
Aged flock, Sid Conger, Flat Rock, Ind	10 00
Second, Sid Conger, Flat Rock, Ind	6 00
Young flocks, J. C. Williamson, Xenia, Ohio	10 00
Second, Uriah Privett & Co., Greensburg, Ind	6 00
Third, Sid Conger, Flat Rock, Ind	2 00
Best ram, George McKerrow, Sussex, Wis	10 00
Best ewe, J. C. Williamson, Xenia, Ohio	10 00

CLASS XXII—Hampshire Down.

(Marion Williams, Judge.)

RAMS.

2 years old and over, Ira J. Hiller, Four Towns, Mich	$8 00
Second, John Milton, Marshall, Mich	5 00
1 to 2 years old, John Milton, Marshall, Mich	8 00
Second, Ira J. Hiller, Four Towns, Mich	5 00
Lamb, John Milton, Marshall, Mich	8 00
Second, Ira J. Hiller, Four Towns, Mich	5 00
Third, John Milton, Marshall, Mich	3 00

EWES.

2 years old and over, John Milton, Marshall, Mich	$8 00
Second, Ira J. Hiller, Four Towns, Mich	5 00
1 to 2 years old, John Milton, Marshall, Mich	8 00
Second, Ira J. Hiller, Four Towns, Mich	5 00
Third, John Milton, Marshall, Mich	3 00
Lamb, John Milton, Marshall, Mich	8 00
Second, Ira J. Hiller, Four Towns, Mich	5 00
Third, Ira J. Hiller, Four Towns, Mich	3 00
Aged flock, John Milton, Marshall, Mich	10 00
Young flock, Ira J. Hiller, Four Towns, Mich	10 00
Second, John Milton, Marshall, Mich	6 00
Best ram, Ira J. Hiller, Four Towns, Mich	10 00
Best ewe, John Milton, Marshall, Mich	10 00

CLASS XXIII—American, Spanish and Delaine Merino.

(S. H. Todd, Judge.)

RAMS.

2 years old and over, F. W. Perkins, West Mansfield, Ohio	$9 00
Second, Uriah Cook, West Mansfield, Ohio	6 00
Third, R. D. Williamson, Xenia, Ohio	3 00
1 to 2 years old, C. H. Williams, Church, Mich	9 00
Second, F. W. Perkins, West Mansfield, Ohio	6 00
Third, R. D. Williamson, Xenia, Ohio	3 00
Lamb, F. W. Perkins, West Mansfield, Ohio	9 00
Second, C. H. Williams, Church, Mich	6 00
Third, Wilson Bros., Frederickstown, Ohio	3 00

EWES.

2 years old and over, C. H. Williams, Church, Mich	$9 00
Second, Uriah Cook, West Mansfield, Ohio	6 00
Third, R. D. Williamson, Xenia, Ohio	3 00
1 to 2 years old, Wilson Bros., Fredrickstown, Ohio	9 00
Second, F. W. Perkins, West Mansfield, Ohio	6 00
Third, F. W. Perkins, West Mansfield, Ohio	3 00
Lamb, F. W. Perkins, West Mansfield, Ohio	9 00
Second, Uriah Cook, West Mansfield, Ohio	6 00
Third, C. H. Williams, Church, Mich	3 00
Aged flock, F. W. Perkins, West Mansfield, Ohio	10 00
Second, Wilson Bros., Fredrickstown, Ohio	6 00
Third, R. D. Williamson, Xenia, Ohio	2 00
Young flocks, F. W. Perkins, West Mansfield, Ohio	10 00
Second, C. H. Williams, Church, Mich	6 00
Third, Uriah Cook, West Mansfield, Ohio	2 00
Best ram, Uriah Cook, West Mansfield, Ohio	10 00
Best ewe, R. D. Williamson, Xenia, Ohio	10 00

CLASS XXIV—Rambouillets.

(Marion Williams, Judge.)

RAMS.

2 years old and over, A. A. Bates, Irwin, Ohio	$6 00
Second, John E. Webb, Webb, Ind	4 00
Third, John E. Webb, Webb, Ind	2 00
1 to 2 years old, A. A. Bates, Irwin, Ohio	6 00

Second, A. A. Bates, Irwin, Ohio	4 00
Lamb, A. A. Bates, Irwin, Ohio	6 00
Second, A. A. Bates, Irwin, Ohio	4 00
Third, A. A. Bates, Irwin, Ohio	2 00

EWES.

2 years old and over, A. A. Bates, Irwin, Ohio	$6 00
Second, A. A. Bates, Irwin, Ohio	4 00
Third, A. A. Bates, Irwin, Ohio	2 00
1 to 2 years old, A. A. Bates, Irwin, Ohio	6 00
Second, A. A. Bates, Irwin, Ohio	4 00
Third, A. A. Bates, Irwin, Ohio	2 00
Lamb, A. A. Bates, Irwin, Ohio	6 00
Second, A. A. Bates, Irwin, Ohio	4 00
Third, A. A. Bates, Irwin, Ohio	2 00
Aged flock, A. A. Bates, Irwin, Ohio	8 00
Second, A. A. Bates, Irwin, Ohio	5 00
Young flock, A. A. Bates, Irwin, Ohio	8 00
Second, A. A. Bates, Irwin, Ohio	5 00
Best ram, A. A. Bates, Irwin, Ohio	10 00
Best ewe, A. A. Bates, Irwin, Ohio	10 00

CLASS XXV—Cheviot.

(Marion Williams, Judge.)

RAMS.

2 years old and over, Ira J. Hiller, Four Towns, Mich	$4 00
Second, W. S. Crodian, Fincastle, Ind	2 00
1 to 2 years old, Ira J. Hiller, Four Towns, Mich	4 00
Second, W. S. Crodian, Fincastle, Ind	2 00
Lamb, W. S. Crodian, Fincastle, Ind	4 00
Second, W. S. Crodian, Fincastle, Ind	2 00

EWES.

2 years old and over, Ira J. Hiller, Four Towns, Mich	$4 00
Second, W. S. Crodian, Fincastle, Ind	2 00
1 to 2 years old, Ira J. Hiller, Four Towns, Mich	4 00
Second, W. S. Crodian, Fincastle, Ind	2 00
Lamb, W. S. Crodian, Fincastle, Ind	4 00
Second, Ira J. Hiller, Four Towns, Mich	2 00
Aged flock, W. S. Crodian, Fincastle, Ind	8 00
Second, W. S. Crodian, Fincastle, Ind	4 00
Young flock, W. S. Crodian, Fincastle, Ind	8 00
Best ram, Ira J. Hiller, Four Towns, Mich	8 00
Best ewe, Ira J. Hiller, Four Towns, Mich	8 00

CLASS XXVI—Tunis.

(Marion Williams, Judge.)

RAMS.

2 years old and over, J. A. Guilliams, Fincastle, Ind.	$4 00
Second, Charles Roundtree, Yountsville, Ind.	2 00
1 to 2 years old, Charles Roundtree, Yountsville, Ind.	4 00
Lamb, J. A. Guilliams, Fincastle, Ind.	4 00
Second, Charles Roundtree, Yountsville, Ind.	2 00

EWES.

2 years old and over, J. A. Guilliams, Fincastle, Ind.	$4 00
Second, Charles Roundtree, Yountsville, Ind.	2 00
1 to 2 years old, Charles Roundtree, Yountsville, Ind.	4 00
Second, J. A. Guilliams, Fincastle, Ind.	2 00
Lamb, Charles Roundtree, Yountsville, Ind.	4 00
Second, J. A. Guilliams, Fincastle, Ind.	2 00
Aged flock, J. A. Guilliams, Fincastle, Ind.	8 00
Second, Charles Roundtree, Yountsville, Ind.	4 00
Young flock, Charles Roundtree, Yountsville, Ind.	8 00
Second, J. A. Guilliams, Fincastle, Ind.	4 00
Best ram, J. A. Guilliams, Fincastle, Ind.	8 00
Best ewe, Charles Roundtree, Yountsville, Ind.	8 00

Respectfully submitted,

JOHN L. THOMPSON,
Superintendent.

REPORT OF SUPERINTENDENT OF POULTRY DEPARTMENT FOR 1897.

Mr. President and Members of the Delegate Board of the Indiana State Board of Agriculture:

Gentlemen—The exhibit was attractive and larger than usual. The work of the judge as a rule gave good satisfaction. Total entries, 1,705. Expenses of the Department as follows:

I. M. Barker	$19 00
Frank H. Baldridge, assistant	24 00
F. R. Hale, assistant	29 20
Robert Hale, assistant	6 00
Total expense for the Department	$78 20

AWARDS.

CLASS XXXII—Poultry.

(I. N. Barker, Judge.)

ASIATICS.

Light Brahma cock, Sid Conger, Flat Rock, Ind	$2 00
Second, A. L. Preston, Haughville, Ind	1 00
Light Brahma hen, N. E. Woods, Pecksburg, Ind	2 00
Second, Sid Conger, Flat Rock, Ind	1 00
Light Brahma cockerel, N. E. Woods, Pecksburg, Ind	2 00
Second, N. E. Woods, Pecksburg, Ind	1 00
Light Brahma pullet, N. E. Woods, Pecksburg, Ind	2 00
Second, N. E. Woods, Pecksburg, Ind	1 00
Dark Brahma cock, T. H. Buck, Morristown, Ind	2 00
Second, B. F. Duncan, Greenfield, Ind	1 00
Dark Brahma hen, T. H. Buck, Morristown, Ind	2 00
Second, B. F. Duncan, Greenfield, Ind	1 00
Dark Brahma cockerel, Leonard Bros., Gem, Ind	2 00
Second, T. H. Buck, Morristown, Ind	1 00
Dark Brahma pullet, Leonard Bros., Gem, Ind	2 00
Second, T. H. Buck, Morristown, Ind	1 00
Buff Cochin cock, C. Matthews & Son, Manilla, Ind	2 00
Second, George Ewald, Cincinnati, Ohio	1 00
Buff Cochin hen, George Ewald, Cincinnati, Ohio	2 00
Second, D. F. Lee, Zionsville, Ind	1 00
Buff Cochin cockerel, A. G. Oliver, Newark, Del	2 00
Second, Sid Conger, Flat Rock, Ind	1 00
Buff Cochin pullet, C. Matthews & Son, Manilla, Ind	2 00
Second, Clair Johnson, Rushville, Ind	1 00
Partridge Cochin cock, W. F. Sayler, Newmarket, Ind	2 00
Second, W. R. Zike, Morristown, Ind	1 00
Partridge Cochin hen, Leonard Bros., Gem, Ind	2 00
Second, Warbritton Bros., Ladoga, Ind	1 00
Partridge Cochin cockerel, W. R. Zike, Morristown, Ind	2 00
Second, T. H. Buck, Morristown, Ind	1 00

Partridge Cochin pullet. Sid Conger, Flat Rock, Ind	2 00
Second, T. H. Buck. Morristown, Ind	1 00
White Cochin cock. George Ewald, Cincinnati, Ohio	2 00
Second, T. N. Smiley & Son, Milligan, Ind	1 00
White Cochin hen. W. O. Swain, Manilla, Ind	2 00
Second, W. O. Swain, Manilla, Ind	1 00
White Cochin cockerel. Warbritton Bros., Ladoga, Ind	2 00
Second, T. N. Smiley & Son, Milligan, Ind	1 00
White Cochin pullet. Warbritton Bros., Ladoga, Ind	2 00
Second, W. O. Swain, Manilla, Ind	1 00
Black Cochin cock, B. F. Hill, Indianapolis	2 00
Second, Leonard Bros., Gem, Ind	1 00
Black Cochin hen, B. F. Hill, Indianapolis	2 00
Second, B. F. Hill, Indianapolis	1 00
Black Cochin cockerel, B. F. Hill, Indianapolis	2 00
Second, B. F. Hill, Indianapolis	1 00
Black Cochin pullet, B. F. Hill, Indianapolis	2 00
Second, B. F. Hill, Indianapolis	1 00
Black Langshan cock, Sid Conger, Flat Rock, Ind	2 00
Second, J. H. Eren, Greenfield, Ind	1 00
Black Langshan hen, J. H. Eren, Greenfield, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
Black Langshan cockerel, Sid Conger, Flat Rock, Ind	2 00
Second, Chas. R. Swain, Zionsville, Ind	1 00
Black Langshan pullet, Chas. R. Swain, Zionsville, Ind	2 00
Second, Sid Conger, Flat Rock, Ind	1 00
White Langshan cock. Mill Creek Poultry Yards, Hillsdale, Mich	2 00
Second, T. N. Smiley & Son, Milligan, Ind	1 00
White Langshan hen. T. H. Buck, Morristown, Ind	2 00
Second, Mill Creek Poultry Yards, Hillsdale, Mich	1 00
White Langshan cockerel, T. N. Smiley & Son, Milligan, Ind	2 00
Second, T. N. Smiley & Son, Milligan, Ind	1 00
White Langshan pullet, T. N. Smiley & Son, Milligan, Ind	2 00
Second, T. N. Smiley & Son, Milligan, Ind	1 00

AMERICAN.

Barred Plymouth Rock cock, Sid Conger, Flat Rock, Ind	2 00
Second. W. R. Zike. Morristown, Ind	1 00
Barred Plymouth Rock hen, W. R. Zike, Morristown, Ind	2 00
Second, W. R. Zike, Morristown, Ind	1 00
Barred Plymouth Rock cockerel, Sid Conger, Flat Rock, Ind	2 00
Second, W. F. Sayler, Newmarket, Ind	1 00
Barred Plymouth Rock pullet, Sid Conger, Flat Rock, Ind	2 00
Second, W. F. Sayler, Newmarket, Ind	1 00
White Plymouth Rock cock, Leonard Bros., Gem, Ind	2 00

Second, Peter Stohry, Shelbyville, Ind	1 00
White Plymouth Rock hen, Peter Stohry, Shelbyville, Ind	2 00
Second, Leonard Bros., Gem, Ind	1 00
White Plymouth cockerel, Warbritton Bros., Ladoga, Ind	2 00
Second, J. B. Flathers, Mapleton, Ind	1 00
White Plymouth Rock pullet, W. A. Craver, Fillmore, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
Silver Wyandotte cock, T. N. Smiley & Son, Milligan, Ind	2 00
Second, J. F. Converse, Woodville, N. Y	1 00
Silver Wyandotte hen, T. N. Smiley & Son, Milligan, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
Silver Wyandotte cockerel, Wesley Lannis, Greensburg, Ind	2 00
Second, Hornung & Son, Sunman, Ind	1 00
Silver Wyandotte pullet, T. N. Smiley & Son, Milligan, Ind	2 00
Second, J. F. Converse, Woodville, N. Y	1 00
Golden Wyandotte cock, A. G. Oliver, Newark, Del	2 00
Second, Geo. F. Barnett, Franklin, Ind	1 00
Golden Wyandotte hen, A. G. Oliver, Newark, Del	2 00
Second, Geo. F. Barnett, Franklin, Ind	1 00
Golden Wyandotte cockerel, Geo. F. Barnett, Franklin, Ind	2 00
Second, Hornung & Son, Sunman, Ind	1 00
Golden Wyandotte pullet, Hornung & Son, Sunman, Ind	2 00
Second, T. H. Buck, Morristown, Ind	1 00
White Wyandotte cock, Indiana Poultry Farm, Indianapolis	2 00
Second, J. B. Flathers, Mapleton, Ind	1 00
White Wyandotte hen, W. A. Craver, Fillmore, Ind	2 00
Second, W. A. Craver, Fillmore, Ind	1 00
White Wyandotte cockerel, Wesley Lannis, Greensburg, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
White Wyandotte pullet, W. A. Craver, Fillmore, Ind	2 00
Second, H. C. Green, Mapleton, Ind	1 00

GAME.

Black breasted red cock, J. A. Guilliams, Fincastle, Ind	2 00
Second, Wesley Lannis, Greensburg, Ind	1 00
Black breasted red hen, J. A. Guilliams, Fincastle, Ind	2 00
Second, Wesley Lannis, Greensburg, Ind	1 00
Black breasted red cockerel, J. A. Guilliams, Fincastle, Ind	2 00
Second, J. A. Guilliams, Fincastle, Ind	1 00
Black breasted red pullet, J. A. Guilliams, Fincastle, Ind	2 00
Second, J. A. Guilliams, Fincastle, Ind	1 00
Cornish Indian cock, Wesley Lannis, Greensburg, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
Cornish Indian hen, C. M. Wandling, Owensboro, Ky	2 00
Second, Warbritton Bros., Ladoga, Ind	1 00

Cornish Indian cockerel, J. B. Landiver, Newcastle, Ind	2 00
Second, B. F. Duncan, Greenfield, Ind	1 00
Cornish Indian pullet, J. H. Eren, Greenfield, Ind	2 00
Second, B. F. Duncan, Greenfield, Ind	1 00
Red pile cock, Wesley Lannis, Greensburg, Ind	2 00
Second, J. H. Eren, Greenfield, Ind	1 00
Red pile hen, A. G. Oliver, Newark, Del	2 00
Second, Wesley Lannis, Greensburg, Ind	1 00
Red pile cockerel, A. G. Oliver, Newark, Del	2 00
Second, Wesley Lannis, Greensburg, Ind	1 00
Red pile pullet, Wesley Lannis, Greensburg, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00

LEGHORNS.

White cock (S. C.), William Tobin, Indianapolis	2 00
Second, William Tobin, Indianapolis	1 00
White hen (S. C.), William Tobin, Indianapolis	2 00
Second, William Tobin, Indianapolis	1 00
White cockerel (S. C.), William Tobin, Indianapolis	2 00
Second, William Tobin, Indianapolis	1 00
White pullet (S. C.), William Tobin, Indianapolis	2 00
Second, William Tobin, Indianapolis	1 00
White cock (R. C.), A. G. Oliver, Newark, Del	2 00
Second, T. N. Smiley & Son, Milligan, Ind	1 00
White hen (R. C.), W. O. Swain, Manilla, Ind	2 00
Second, Leonard Bros., Gem, Ind	1 00
White cockerel (R. C.), W. O. Swain, Manilla, Ind	2 00
Second, T. N. Smiley & Son, Milligan, Ind	1 00
White pullet (R. C.), W. O. Swain, Manilla, Ind	2 00
Second, W. O. Swain, Manilla, Ind	1 00
Brown cock (S. C.), J. P. Baxley, Anthony, Ind	2 00
Second, Ed B. Murphy, Carmel, Ind	1 00
Brown hen (S. C.), J. P. Baxley, Anthony, Ind	2 00
Second, Ed B. Murphy, Carmel, Ind	1 00
Brown cockerel (S. C.), Ed B. Murphy, Carmel, Ind	2 00
Second, Ed B. Murphy, Carmel, Ind	1 00
Brown pullet (S. C.), Ed B. Murphy, Carmel, Ind	2 00
Second, Ed B. Murphy, Carmel, Ind	1 00
Brown cock (R. C.), C. R. Melhouse, Indianapolis	2 00
Second, Peter Stohrey, Shelbyville, Ind	1 00
Brown hen (R. C.), C. R. Melhouse, Indianapolis	2 00
Second, A. G. Oliver, Newark, Del	1 00
Brown cockerel (R. C.), Peter Stohry, Shelbyville, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
Brown pullet (R. C.), Peter Stohrey, Shelbyville, Ind	2 00

Second, Peter Stohrey, Shelbyville, Ind	1 00
Buff cock, Indiana Poultry Farm, Indianapolis	2 00
Second, Chas. E. Bernhardt	1 00
Buff hen, Chas. E. Bernhardt	2 00
Second, F. E. Mow, Union Mills, Ind	1 00
Buff cockerel, F. E. Mow, Union Mills, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
Buff pullet, F. E. Mow, Union Mills, Ind	2 00
Second, F. E. Mow, Union Mills, Ind	1 00
Black cock, B. F. Duncan, Greenfield, Ind	2 00
Second, Willow Creek Poultry Yards, Hillsdale, Mich	1 00
Black hen, Warbritton Bros., Ladoga, Ind	2 00
Second, George Ewald, Cincinnati, Ohio	1 00
Black cockerel, W. F. Sayler, Newmarket, Ind	2 00
Second, Warbritton Bros., Ladoga, Ind	1 00
Black pullet, Hornung & Son, Sunman, Ind	2 00
Second, W. F. Sayler, Newmarket, Ind	1 00

HOUDAN.

Cock, A. G. Oliver, Newark, Del	2 00
Second, Warbritton Bros., Ladoga, Ind	1 00
Hen, A. G. Oliver, Newark, Del	2 00
Second, Hornung & Son, Sunman, Ind	1 00
Cockerel, Hornung & Son, Sunman, Ind	2 00
Second, Hornung & Son, Sunman, Ind	1 00
Pullet, Leonard Bros., Gem, Ind	2 00
Second, Leonard Bros., Gem, Ind	1 00

BLACK SPANISH.

White-faced cock, Hornung & Son, Sunman, Ind	2 00
Second, A. G. Oliver, Newark, Del	1 00
White-faced hen, A. G. Oliver, Newark, Del	2 00
Second, Hornung & Son, Sunman, Ind	1 00
White-faced cockerel, Hornung & Son, Sunman, Ind	2 00
Second, G. A. Grassow, Indianapolis	1 00
White-faced pullet, G. A. Grassow, Indianapolis	2 00
Second, G. A. Grassow, Indianapolis	1 00

MINORCAS.

Black cock, A. G. Oliver, Newark, Del	2 00
Second, Meredith & Schulhoof, Indianapolis	1 00
Black hen, Meredith & Schulhoof, Indianapolis	2 00
Second, Ben W. White, Crawfordsville	1 00
Black cockerel, Ben W. White, Crawfordsville	2 00

Second. T. H. Buck, Morristown, Ind	1 00
Black pullet, Ben W. White, Crawfordsville, Ind	2 00
Second. Meredith & Schulhoof, Indianapolis	1 00

HAMBURGS.

Golden cock, A. G. Oliver, Newark, Del	1 00
Second, T. H. Buck, Morristown, Ind	50
Golden hen, George Ewald, Cincinnati, Ohio	1 00
Second, T. H. Buck, Morristown, Ind	50
Golden cockerel, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50
Golden pullet, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50
Silver cock, A. G. Oliver, Newark, Del	1 00
Second, T. N. Smiley & Son, Milligan, Ind	50
Silver hen, A. G. Oliver, Newark, Del	1 00
Second. T. H. Buck, Morristown, Ind	50
Silver cockerel, A. G. Oliver, Newark, Del	1 00
Second, T. N. Smiley & Son, Milligan, Ind	50
Silver pullet, A. G. Oliver, Newark, Del	1 00
Second. T. H. Buck, Morristown, Ind	50
Black cock, A. G. Oliver, Newark, Del	1 00
Second, Mill Creek Poultry Yards, Hillsdale, Mich	50
Black hen, A. G. Oliver, Newark, Del	1 00
Second, Mill Creek Poultry Yards, Hillsdale, Mich	50
Black cockerel, Mill Creek Poultry Yards, Hillsdale, Mich	1 00
Second, A. G. Oliver, Newark, Del	50
Black pullet, Mill Creek Poultry Yards, Hillsdale, Mich	1 00
Second, A. G. Oliver, Newark, Del	50

POLISH.

W. C. B. cock, A. G. Oliver, Newark, Del	1 00
Second, T. H. Buck, Morristown, Ind	50
W. C. B. hen, T. H. Buck, Morristown, Ind	1 00
Second, Hornung & Son, Sunman, Ind	50
W. C. B. cockerel, Hornung & Son, Sunman, Ind	1 00
Second, Hornung & Son, Sunman, Ind	50
W. C. B. pullet, Hornung & Son, Sunman, Ind	1 00
Second, Hornung & Son, Sunman, Ind	50
Golden cock or cockerel, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50
Golden hen or pullet, George Ewald, Cincinnati, Ohio	1 00
Second. B. F. Duncan, Greenfield, Ind	50
Silver cock, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50

Silver hen, George Ewald, Cincinnati, Ohio	1 00
Second, A. G. Oliver, Newark, Del	50
Silver cockerel, A. G. Oliver, Newark, Del	1 00
Second, T. H. Buck, Morristown, Ind	50
Silver pullet, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50

JAVA.

Black cock or cockerel, Ed B. Murphy, Carmel, Ind	1 00
Second, A. G. Oliver, Newark, Del	50
Black hen or pullet, Ed B. Murphy, Carmel, Ind	1 00
Second, A. G. Oliver, Newark, Del	50

DORKINGS.

Colored cock or cockerel, A. G. Oliver, Newark, Del	1 00
Second, Warbritton Bros., Ladoga, Ind	50
Colored hen or pullet, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50
Silver-gray cock or cockerel, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50
Silver-gray hen or pullet, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50

RED CAPS.

Cock, A. G. Oliver, Newark, Del	1 00
Second, T. H. Buck, Morristown, Ind	50
Hen, A. G. Oliver, Newark, Del	1 00
Second, T. H. Buck, Morristown, Ind	50
Cockerel, Warbritton Bros., Ladoga, Ind	1 00
Second, A. G. Oliver, Newark, Del	50
Pullet, Warbritton Bros., Ladoga, Ind	1 00
Second, A. G. Oliver, Newark, Del	50

BANTAMS—SEABRIGHTS.

Golden cock, T. N. Smiley & Son, Milligan, Ind	1 00
Second, George Ewald, Cincinnati, Ohio	50
Golden hen, B. F. Duncan, Greenfield, Ind	1 00
Second, George Ewald, Cincinnati, Ohio	50
Golden cockerel, A. G. Oliver, Newark, Del	1 00
Second, B. F. Duncan, Greenfield, Ind	50
Golden pullet, B. F. Duncan, Greenfield, Ind	1 00
Second, A. G. Oliver, Newark, Del	50
Silver cock or cockerel, Hornung & Son, Sunman, Ind	1 00
Second, George Ewald, Cincinnati, Ohio	50

Silver hen or pullet, Hornung & Son, Sunman, Ind	1 00
Second, A. G. Oliver, Newark, Del	50
Japanese cock or cockerel, George Ewald, Cincinnati, Ohio	1 00
Second, A G. Oliver, Newark, Del	50
Japanese hen or pullet, George Ewald, Cincinnati, Ohio	1 00
Second, George Ewald, Cincinnati, Ohio	50
Black (R. C.) cock or cockerel, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50
Black (R. C.) hen or pullet, A. G. Oliver, Newark, Del	1 00
Second, Willow Creek Poultry Yards, Hillsdale, Mich	50

GAME BANTAMS.

Red (B. B.) cock, H. V. Hornung & Son, Sunman, Ind	1 00
Second, George Ewald, Cincinnati, Ohio	50
Red (B. B.) hen, A. G. Oliver, Newark, Del	1 00
Second, George Ewald, Cincinnati, Ohio	50
Red (B. B.) cockerel, H. V. Horning, Sumpter, Ind	1 00
Second, George Ewald, Cincinnati, Ohio	50
Red (B. B.) pullet, H. V. Hornung & Son, Sunman, Ind	1 00
Second, A. G. Oliver, Newark, Del	50
Silver Duckwing cock, W. R. Zike, Morristown, Ind	1 00
Second, F. H. Hale, Shelbyville, Ind	50
Silver Duckwing hen, A. G. Oliver, Newark, Del	1 00
Second, George Ewald, Cincinnati, Ohio	50
Silver Duckwing cockerel, J. B. Landiver, New Castle, Ind	1 00
Second, Hornung & Son, Sunman, Ind	50
Silver Duckwing pullet, George Ewald, Cincinnati, Ohio	1 00
Second, Landers & Miller, Kokomo, Ind	50
Red Pile cock, A. G. Oliver, Newark, Del	1 00
Second, F. H. Hale, Shelbyville, Ind	50
Red Pile hen, George Ewald, Cincinnati, Ohio	1 00
Second, A. G. Oliver, Newark, Del	50
Red Pile cockerel, Wesley Lannis, Greensburg, Ind	1 00
Second, A. G. Oliver, Newark, Del	50
Red Pile pullet, A. G. Oliver, Newark, Del	1 00
Second, A. G. Oliver, Newark, Del	50
Brown Red cock, Willow Creek Poultry Yards, Hillsdale, Mich	1 00
Second, F. H. Hale, Shelbyville, Ind	50
Brown Red hen, F. H. Hale, Shelbyville, Ind	1 00
Second, A. G. Oliver, Newark, Del	50
Brown Red cockerel, F. H. Hale, Shelbyville, Ind	1 00
Second, Willow Creek Poultry Yards, Hillsdale, Mich	50
Brown Red pullet, F. H. Hale, Shelbyville, Ind	1 00
Second, Willow Creek Poultry Yards, Hillsdale, Mich	50

BUFF COCHIN BANTAMS.

Cock, W. R. Zike, Morristown, Ind	1 00
Second, T. H. Buck, Morristown, Ind	50
Hen, W. R. Zike, Morristown, Ind	1 00
Second, H. Bloom, Brightwood, Ind	50
Cockerel, W. R. Zike, Morristown, Ind	1 00
Second, Clair Johnson, Rushville, Ind	50
Pullet, W. R. Zike, Morristown, Ind	1 00
Second, Allen Bros., Samong, Ind	50

TURKEYS.

Bronze cock, Jennie Porter, Maywood, Ind	3 00
Second, Leonard Bros., Gem, Ind	2 00
Bronze hen, W. A. Craver, Fillmore, Ind	3 00
Second, Leonard Bros., Gem, Ind	2 00
Bronze cockerel, Leonard Bros., Gem, Ind	3 00
Second, Sam Gardner & Son, Fincastle, Ind	2 00
Bronze pullet, Sam Gardner & Son, Fincastle, Ind	3 00
Second, Jennie Porter, Maywood, Ind	2 00
White Holland cock, W. A. Craver, Fillmore, Ind	3 00
Second, Sam Gardner & Son, Fincastle, Ind	2 00
White Holland hen, Sam Gardner & Son, Fincastle, Ind	3 00
Second, W. A. Craver, Fillmore, Ind	2 00
White Holland cockerel, Sam Gardner & Son, Fincastle, Ind	3 00
Second, Sam Gardner & Son, Fincastle, Ind	2 00
White Holland pullet, Sam Gardner & Son, Fincastle, Ind	3 00
Second, W. A. Craver, Fillmore, Ind	2 00
Buff cock or cockerel, A. G. Oliver, Newark, Del	3 00
Buff hen or pullet, A. G. Oliver, Newark, Del	3 00

GEESE.

Pair Toulouse, old, Leonard Bros., Gem, Ind	3 00
Second, A. G. Oliver, Newark, Del	2 00
Pair Toulouse, young, Hornung & Son, Sunman, Ind	3 00
Second, Warbritton Bros., Ladoga, Ind	2 00
Pair Embden, old, Leonard Bros., Ladoga, Ind	3 00
Second, Hornung & Son, Sunman, Ind	2 00
Pair Embden, young, T. N. Smiley & Son, Milligan, Ind	3 00
Second, J. P. Baxla, Anthony, Ind	2 00
Pair Chinese, old or young, A. G. Oliver, Newark, Del	3 00
Second, J. P. Baxla, Anthony, Ind	2 00

DUCKS.

Pair Pekin, Peter Stohrey, Shelbyville, Ind	3 00
Second, Jennie Porter, Maywood, Ind	2 00
Pair Aylesbury, J. P. Baxla, Anthony, Ind	3 00
Second, A. G. Oliver, Newark, Del	2 00
Pair Rouen, A. G. Oliver, Newark, Del	3 00
Second, J. P. Baxla, Anthony, Ind	2 00
Pair Muscovy, J. H. Eren, Greenfield, Ind	3 00
Second, A. G. Oliver, Newark, Del	2 00

BREEDING PENS.

Light Brahma, N. E. Woods, Pecksburg, Ind	$5 00
Second, Sid Conger, Flat Rock, Ind	3 00
Dark Brahma, T. H. Buck, Morristown, Ind	5 00
Second, T. N. Smiley & Son, Milligan, Ind	3 00
Buff Cochin, C. Matthews & Son, Manilla, Ind	5 00
Second, Sid Conger, Flat Rock, Ind	3 00
Partridge Cochin, W. F. Sayler, Newmarket, Ind	5 00
Second, Leonard Bros., Gem, Ind	3 00
White Cochin, W. O. Swain, Manilla, Ind	5 00
Second, T. N. Smiley & Son, Milligan, Ind	3 00
Black Cochin, B. F. Hill, Indianapolis	5 00
Second, B. F. Hill, Indianapolis	3 00
Barred Plymouth Rock, Sid Conger, Flat Rock, Ind	5 00
Second, W. R. Zike, Morristown, Ind	3 00
White Plymouth Rock, Peter Stohrey, Shelbyville, Ind	5 00
Second, Warbritton Bros., Ladoga, Ind	3 00
Golden Wyandottes, Geo. F. Barnett, Franklin, Ind	5 00
Second, Hornung & Son, Sunman, Ind	3 00
Silver Wyandottes, T. N. Smiley & Son, Milligan, Ind	5 00
Second, Hornung & Son, Sunman, Ind	3 00
White Wyandottes, Indiana Poultry Farm, Indianapolis	5 00
Second, W. A. Craver, Fillmore, Ind	3 00
Black Langshan, Sid Conger, Flat Rock, Ind	5 00
Second, J. H. Eren, Greenfield, Ind	3 00
Red Cap, T. H. Buck, Morristown, Ind	4 00
Black breasted red game, J. A. Guilliams, Fincastle, Ind	4 00
Second, Wesley Lannis, Greensburg, Ind	2 00
Indian game, Wesley Lannis, Greensburg, Ind	4 00
Second, J. H. Eren, Greenfield, Ind	2 00
Brown Leghorn, Ed B. Murphy, Carmel, Ind	4 00
Second, J. P. Baxla, Anthony, Ind	2 00
White Leghorn, William Tobin, Indianapolis	4 00

Second, William Tobin, Indianapolis	2 00
Black Minorcas, Ben W. Wilhite, Crawfordsville, Ind	4 00
Second, Meredith & Schulhoof, Indianapolis	2 00
Houdan, Leonard Bros., Gem, Ind	4 00
Second, Warbritton Bros., Ladoga, Ind	2 00
W. Black Spanish, Hornung & Son, Sunman, Ind	4 00
Second, G. A. Grassow, Indianapolis	2 00
Silver Hamburg, T. N. Smiley & Son, Milligan, Ind	4 00
Second, T. H. Buck, Morristown, Ind	2 00
W. C. B. Polish, Hornung & Son, Sunman, Ind	4 00
Second, T. H. Buck, Morristown, Ind	2 00
Silver Polish, A. G. Oliver, Newark, Del	4 00
Second, George Ewald, Cincinnati, Ohio	2 00
Game Bantams, A. G. Oliver, Newark, Del	00
Second, Hornung & Son, Sunman, Ind	2 00
Bantams, not game, Hornung & Son, Sunman, Ind	4 00
Second, A. G. Oliver, Newark, Del	2 00

Respectfully submitted,

KNODE PORTER,
Superintendent.

FINE ARTS DEPARTMENT.

To the President and Members of the Delegate Board of the Indiana State Board of Agriculture:

Gentlemen—I beg to submit the following report as Superintendent of the Fine Arts Department, in which the display was as large and complete in most departments as ever before in the history of the Fair. In some of the classes we found it almost impossible to make presentable displays on account of lack of room and proper places for such displays.

The premiums offered attracted many displays from outside the State, and there was strong rivalry among exhibitors, the exhibit in this way being made very attractive. I would repeat the recommendation made by my predecessor that the premium list in this Department be thoroughly revised, and that many useless articles be eliminated from the list and many others now in general use be provided for in the classification. I would further recommend that there be several changes made in the arrangement of the building, so as to give better opportunity for the better display and protection of valuable articles that are placed on exhibition. The expense of this Department for expert judges, assistant superintendents and help was $845.

AWARDS.

CLASS XLII—Knitting and Crochet Work.

(Mrs. R. F. Hight, Judge.)

Infant's shirt, Mrs. C. Dille, Greensburg, Ind	$1 50
Second, Laura I. Bahr, Indianapolis	75
Infant's socks, display, Maud C. Hinsey, Pekin, Ill	1 50
Second, Mrs. P. D. Stagg, Greensburg, Ind	75
Silk mittens, Maud C. Hinsey, Pekin, Ill	1 50
Second, Mrs. Anna Miller, Quincy, Ill	75
Silk stockings, Mrs. C. C. Burns, Greensburg, Ind	2 00
Second, Mrs. A. T. Jackson, Bennington, Ind	1 00
Woolen stockings, Mrs. G. C. Sands, Kokomo, Ind	1 50
Second, Mrs. A. T. Jackson, Bennington, Ind	75
Infant's crochet sacque, Mrs. C. C. Burns, Greensburg, Ind	1 50
Second, Maud C. Hinsey, Pekin, Ill	75
Infant's knit sacque, Mrs. G. McLeod, Cincinnati, Ohio	1 50
Second, Mrs. Charles Nye, Indianapolis	75
Crochet shawl, Mrs. A. T. Jackson, Bennington, Ind	2 00
Second, Mrs. G. McLeod, Cincinnati, Ohio	1 00
Couch cover, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Mrs. A. T. Jackson, Bennington, Ind	1 00
Infant's afghan, Flora Baxter, Indianapolis	1 50
Second, Eleanor Dilks, Indianapolis	75
Crochet skirt, Mrs. G. McLeod, Cincinnati, Ohio	2 00
Second, Maud C. Hinsey, Pekin, Ill	1 00
Child's crochet skirt, Mrs. G. C. Sands, Kokomo, Ind	1 50
Second, Mrs. Lizzie Grinzley, Oakland City, Ind	75
Silk purse, Mrs. P. D. Stagg, Greensburg, Ind	1 50
Second, Mrs. A. T. Jackson, Bennington, Ind	75
Crochet spread, May Thornburg, Indianapolis	2 00
Second, Mrs. R. H. Talbott, Lexington, Ky	1 00

CLASS XLIII—Lace Work.

(Mrs. R. F. Hight, Judge.)

Display point lace, Maud C. Hinsey, Pekin, Ill	$3 00
Second, Mrs. A. E. Sterrett, Allisonville, Ind	1 50
Specimen point lace, Maud C. Hinsey, Pekin, Ill	2 00
Second, rejected.	
Handkerchief, Maud C Hinsey, Pekin, Ill	2 00
Second, Mrs. E. I. Chance, Alpine, Ind	1 00

Silk lace, Maud C. Hinsey, Pekin, Ill	1 50
Second, Mrs. A. T. Jackson, Bennington, Ind	1 00
Honiton lace, Mrs. R. H. Talbott, Lexington, Ky	1 50
Second, Maud C. Hinsey, Pekin, Ill	1 00
Dardinet bedspread, Mrs. W. B. Flick, Lawrence, Ind	2 00
Second, rejected.	
Bed set, Mrs. A. T. Jackson, Bennington, Ind	3 00
Second, Mrs. C. C. Burns, Greensburg, Ind	1 50
Guipure lace, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Maud C. Hinsey, Pekin, Ill	1 00

CLASS XLIV—Embroidery, Hand Made.

(Mrs. R. F. Hight, Judge.)

Cotton, Mrs. C. Dille, Greensburg, Ind	$1 50
Second, Mrs. Hulda Field, Greensburg, Ind	75
Lunch set, Mrs. L. A. Moore, Terre Haute, Ind	3 00
Second, Mrs. C. C. Burns, Greensburg, Ind	2 00
Doiley set, Mrs. R. H. Talbott, Lexington, Ky	2 00
Table cloth and napkins, Mrs. C. Dille, Greensburg, Ind	3 00
Second, A. M. Kistner, Indianapolis	2 00
Hostess cloth, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Mrs. C. C. Burns, Greensburg, Ind	1 00
Tray cloth, Maud C. Hinsey, Pekin, Ill	1 50
Second, Mrs. C. Dille, Greensburg, Ind	75
Handkerchief, Mrs. R. H. Talbott, Lexington, Ky	1 50
Second, Mrs. J. Liebhardt, Knightstown, Ind	75
Silk shirt, Mrs. L. A. Moore, Terre Haute, Ind	2 00
Infant's shawl, Maud C. Hinsey, Pekin, Ill	2 00
Second, Mrs. J. Liebhardt, Knightstown, Ind	1 00
Table cover, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Maud C. Hinsey, Pekin, Ill	1 00
Table scarf, Maud C. Hinsey, Pekin, Ill	2 00
Second, Mrs. L. A. Moore, Terre Haute, Ind	1 00
Piano scarf, Mrs. C. Dille, Greensburg, Ind	2 00
Second, Mrs. L. A. Moore, Terre Haute, Ind	1 00
Dresser furnishings, Mrs. J. J. Garver, Indianapolis	1 50
Second, Mrs. L. A. Moore, Terre Haute, Ind	75
Couch pillow, Maud C. Hinsey, Pekin, Ill	2 00
Second, Mrs. W. McClelland, Crawfordsville, Ind	1 00
Toilet cushion, Mrs. C. Dille, Greensburg, Ind	1 50
Second, E. E. Seiger, Indianapolis	75
Outline towels, Mrs. L. A. Moore, Terre Haute, Ind	1 50
Second, Mrs. A. T. Jackson, Bennington, Ind	75

Outline specimen, Mrs. R. H. Talbott, Lexington, Ky	1 50
Second, Mrs. L. A. Moore, Terre Haute, Ind	75
Outline carving cloth, Mrs. R. H. Talbott, Lexington, Ky	1 50
Second, Maud C. Hinsey, Pekin, Ill	75
Kensington, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Mrs. L. A. Moore, Terre Haute, Ind	1 00
Table center, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Kate Wood, Indianapolis	1 00
Tapestry, Mrs. L. A. Moore, Terre Haute, Ind	2 00
Second, Mrs. Anna Miller, Quincy, Ill	1 00
High art needle work, Mrs. C. Dille, Greensburg, Ind	2 00
Second, Mrs. J. Liebhardt, Knightstown, Ind	1 00
Tinting and embroidery, Mrs. J. J. Garver, Indianapolis	2 00
Second, Mrs. J. E. Haffner, Muncie	1 00
Rope silk, Maud C. Hinsey, Pekin, Ill	1 50
Second, Mrs. A. T. Jackson, Bennington, Ind	75
Queen Anne darning, Maud C. Hinsey, Pekin, Ill	2 00
Second, Mrs. C. Dille, Greensburg, Ind	1 00
Roman embroidery, Maud C. Hinsey, Pekin, Ill	2 00
Second, A. M. Kistner, Indianapolis	1 00
Sorrento embroidery, Mrs. A. Sammons, Michigan City, Ind	2 00
Second, Mrs. C. Dille, Greensburg, Ind	1 00
Etching silk, Eleanor Dilks, Indianapolis	2 00
Second, Mrs. L. A. Moore, Terre Haute, Ind	1 00
Pair towels, Mrs. C. Dille, Greensburg, Ind	2 00
Second, Mrs. G. C. Sands, Kokomo, Ind	1 00
Chamois, Mrs. J. J. Garver, Indianapolis	2 00
Second, Mrs. S. H. Sharer, Indianapolis	1 00
Pair portieres, rejected.	
Denim, specimen, Mrs. H. F. Prince, Indianapolis	2 00
Second, Laura B. Douglass, Indianapolis	1 00
Basket or moile cloth, Mrs. Anna Miller, Quincy, Ill	1 50
Second, Maud C. Hinsey, Pekin, Ill	75
Handkerchief sachet, Mrs. L. A. Moore, Terre Haute, Ind	1 50
Second, E. E. Seiger, Indianapolis	75
Glove sachet, Mrs. A. Sammons, Michigan City, Ind	1 50
Second, Maud C. Hinsey, Pekin, Ill	75
Tea cosey, Mrs. A. Sammons, Michigan City, Ind	1 50
Second. Mrs. P. D. Stagg, Greensburg, Ind	75
Five-o'-clock tea, Mrs. Hulda Field, Greensburg, Ind	1 50
Second. Mrs. Anna Miller, Quincy, Ill	75
Corduroy, Maud C. Hinsey, Pekin, Ill	1 50
Picture frame, Mrs. J. J. Garver, Indianapolis	1 50
Second, Mrs. L. A. Moore, Terre Haute, Ind	75
Bulgarian work, Mrs. G. McLeod, Cincinnati, Ohio	1 50

Second, Anna Krubbe, Indianapolis	75
Carnation, Mrs. Hattie Plow, Rushville, Ind	1 50
Second, Mrs. Hulda Field, Greensburg, Ind	75

CLASS XLV—Sewing—Machine and Hand Work.

(Mrs. Sam'l Carr, Judge.)

Lady's white skirt, Mrs. G. D. Busick, Kokomo, Ind	$1 50
Second, Miss Anna Miller, Quincy, Ill	75
Display ladies' underwear; Miss Anna Dolan, Indianapolis	3 00
Second, Mrs. A. Sammons, Michigan City, Ind	1 50
Hemstitching, Miss Anna Dolan, Indianapolis	1 50
Second, Miss Anna Dolan, Indianapolis	75
Hemstitching, child's dress, Miss Anna Dolan, Indianapolis	1 50
Pair portieres, Mrs. V. L. Wilson, Knightstown, Ind	2 00
High art work, C. Carriger, Indianapolis	2 00
Second, Mrs. Hulda Fields, Greensburg, Ind	1 00
Table cover, Mrs. R. H. Talbott, Lexington, Ky	1 50
Second, Mrs. C. C. Burns, Greensburg, Ind	75
Handkerchief, Mrs R. H. Talbott, Lexington, Ky	1 50
Second, Mrs. Lizzie Grimsley, Oakland City, Ind	75
Display machine work, not awarded.	
Second, Mrs. A. T. Jackson, Bennington, Ind	2 00

HAND WORK.

Hemstitched towels, Laura I. Bahr, Indianapolis, Ind	$1 50
Second, Mrs. E. R. Henley, Westfield, Ind	75
Hemstitched sheet and pillow cases, Mrs. W. S. Hôss, West Indianapolis	2 00
Second, Maud C. Hinsey, Pekin, Ill	1 00
Hemstitched child's dress, H. Jeffrey, Franklin, Ind	2 00
Second, Mrs. A. T. Jackson, Bennington, Ind	1 00
Drawn work, M. F. Gatch, Indianapolis	1 50
Second, Mrs. R. H. Talbott, Lexington, Ky	75
Drawn work, Persian, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Mrs. L. A. Moore, Terre Haute, Ind	1 00
Drawn work, Mexican, Mrs. L. A. Moore, Terre Haute, Ind	2 00
Second, Mrs. C. Dille, Greensburg, Ind	1 00
Infant's outfit, Mrs. C. Dille, Greensburg, Ind	4 00
Second, Mrs. Hulda Fields, Greensburg, Ind	2 00
Infant's dress, Mrs. C. Railsback, Indianapolis	2 00
Second, Mrs. C. Dille, Greensburg, Ind	1 00
Lady's white skirt, Mrs. J. Liebhardt, Knightstown, Ind	2 00
Second, Mrs. C. C. Burns, Greensburg, Ind	1 00

CLASS XLVI—Ladies' Fancy Work.

(Mrs. Sam'l Carr, Judge.)

Handkerchief sachet, A. M Kistner, Indianapolis	$1 50
Second, Mrs. A. Sammons, Michigan City, Ind	75
Glove sachet, M. Sanders, Terre Haute, Ind	1 50
Second, E. E. Seiger, Indianapolis	75
Magazine holder, E. E. Seiger, Indianapolis	1 50
Second, Mrs. A. Sammons, Michigan City, Ind	75
Toilet cushion, Maud C. Hinsey, Pekin, Ill	1 50
Second, Mrs. Lizzie Grimsley, Oakland City, Ind	75
Couch pillow, Katie Lauer, Indianapolis	1 50
Second, A. M. Kistner, Indianapolis	75
Infant's nursery basket, Mrs. Jennie T. Brown, Indianapolis	2 00
Second, Mrs. Chas. Nye, Indianapolis	1 00
Rug, Mrs. C. Dille, Greensburg, Ind	1 50
Second, Mrs. V. L. Wilson, Knightstown, Ind	75
Book cover, Mrs. W. D. McClelland, Crawfordsville	1 50
Second, A. M. Kistner, Indianapolis	75
Lunch set, Mrs. L. A. Moore, Terre Haute, Ind	2 00
Second, Mrs. W. F. Jenkins, Indianapolis	1 00
Doilies, Mrs. C. C. Burns, Greensburg, Ind	1 50
Second, Mrs. L. A. Moore, Terre Haute, Ind	75
Head rest, Mrs. G. C. Sands, Kokomo, Ind	1 50
Second, Mrs. L. A. Moore, Terre Haute, Ind	75
Reticule, May Thornburg, Indianapolis	1 50
Second, Mrs. W. D. McClelland, Crawfordsville, Ind	75
Fancy apron, Mrs. C. Dille, Greensburg, Ind	1 50
Second, Maud C. Hinsey, Pekin, Ill	75
Kitchen apron, Maud C. Hinsey, Pekin, Ill	1 50
Second, Mrs. Hulda Field, Greensburg, Ind	75
Housewife, Mrs. Hollingsworth, Indianapolis	1 50
Second, Mrs. J. B. Powers, Indianapolis	75
Table cover, Mrs. Joe Lucas, Indianapolis	1 50
Second, Mrs. L. A. Moore, Terre Haute, Ind	75
Table center, E. E. Seiger, Indianapolis	1 50
Second, Mrs. Hattie Plow, Rushville, Ind	75
Fancy opera bag, Mrs. R. H. Talbott, Lexington, Ky	1 50
Second, May Thornburg, Indianapolis	75
Laundry bag, Mrs. Lizzie Grimsley, Oakland City, Ind	1 50
Second, Mrs. L. A. Moore, Terre Haute, Ind	75
Darning or dust bag, May Thornburg, Indianapolis	1 50
Second, Mrs. Hulda Fields, Greensburg, Ind	75
Lamp shade, C. Carriger, Indianapolis	1 50
Second, Mrs. Sallie Bacon, Ripple, Ind	75

Table mats, A. M. Kistner, Indianapolis	1 50
Second, Maud C. Hinsey, Pekin, Ill	75
Specimen paper work, Mrs. Sallie Bacon, Ripple, Ind	1 50
Second, Emily J. Jackson, Mapleton, Ind	75
Display paper work, Mrs. Sallie Bacon, Ripple	2 00
Second, Mrs. Sallie Bacon, Ripple	1 00
Silk quilt, Mrs. R. H. Talbott, Lexington, Ky	2 00
Second, Mrs. Hulda Field, Greensburg, Ind	1 00
Crazy quilt, Mrs. Anna Miller, Quincy, Ill	2 00
Second, Mrs. R. H. Talbott, Lexington, Ky	1 00

CLASS XLVII—Decorative Art.

(Jessie F. Moore, Judge.)

Hammered or repousse work, Mrs. S. H. TenEyck, Indianapolis	$2 00
Second, C. Carriger, Indianapolis	1 00
Modeling in clay, Minnie B. Akass, Indianapolis	4 00
Second, Minnie B. Akass, Indianapolis	2 00
Carved or incision work, Minnie B. Akass, Indianapolis	3 00
Second, Minnie B. Akass, Indianapolis	2 00
Bas-relief, Mrs. Marie Folger, Indianapolis	4 00
Second, M. A. Goodwin, Newcastle, Ind	2 00
Display wood carving, Mrs. S. H. Shearer, Indianapolis	8 00
Specimen wood carving, Mrs. S. H. Shearer, Indianapolis	4 00
Second, Mrs. Wm. Welsch, Indianapolis	2 00
Painting on bolting cloth, A. M. Kistner, Indianapolis	2 00
Second, Mrs. Wm. Welsch, Indianapolis	1 00
Painting on chamois, A. M. Kistner, Indianapolis	2 00
Second, M. A. Goodwin, Newcastle, Ind	1 00
Painting on matting, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. W. S. Day, Indianapolis	1 00
Tapestry painting, Anna Knubbe, Indianapolis	5 00
Second, Mrs. G. McLeod, Cincinnati, Ohio	3 00
Painted menu cards, Anna Knubbe, Indianapolis	5 00
Second, Minnie B. Akass, Indianapolis	3 00
Blotting pad, Mrs. Wm. Welsch, Indianapolis	2 00
Second, Minnie B. Akass, Indianapolis	1 00
Calendar, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. G. McLeod, Cincinnati, Ohio	1 00
Letter case, Mrs. J. E. Haffner, Muncie, Ind	2 00
Second, Minnie B. Akass, Indianapolis	1 00
Visiting list, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. G. McLeod, Cincinnati, Ohio	1 00
Photograph frame, M. I. Julian, Indianapolis	2 00

Second, Miss Nina Hill, Indianapolis	1 00
Painted fire screen, Mrs. S. H. Shearer, Indianapolis	4 00
Second, Mrs. Wm. Welsch, Indianapolis	2 00
Display photography, Minnie B. Akass, Indianapolis	5 00
Specimen photography, Minnie B. Akass, Indianapolis	4 00
Collection new and useful articles, Mrs. M. E. Chance, Alpine, Ind.	4 00
Second, M. I. Julian, Indianapolis	2 00
Bonbons, M. E. McKee, Indianapolis	3 00
Second, Mrs. M. E. Chance, Alpine, Ind	2 00
Decorated tray, Mrs. E. H. Meyer, Indianapolis	2 00
Second, M. I. Julian, Indianapolis	1 00
Tapestry ceiling pieces, Minnie B. Akass, Indianapolis	4 00
Tapestry hall pieces, Minnie B. Akass, Indianapolis	3 00
Second, Mrs. Wm. Welsch, Indianapolis	2 00

CLASS XLVIII—Art Work, Amateur.

(Mrs. Jap Andrews, Judge.)

Portrait in oil, life, Mrs. G. McLeod, Cincinnati, O	$10 00
Second, Minnie B. Akass, Indianapolis	5 00
Portrait in crayon, life, Minnie B. Akass, Indianapolis	4 00
Second, Miss A. Sloan, Indianapolis	2 00
Portrait in pastel, life, Mrs. G. D. Busick, Kokomo, Ind	4 00
Second, Mrs. Clinton Hall, Indianapolis	2 00
Portrait in water color, life, Minnie B. Akass, Indianapolis	6 00
Second, Miss A. Sloan, Indianapolis	3 00
Ideal head in oil, Mrs. Clinton Hall, Indianapolis	2 00
Second, Mrs. C. Railsback, Indianapolis	1 00
Ideal head in crayon, Mrs. Clinton Hall, Indianapolis	2 00
Second, Mrs. C. M. Leet, Indianapolis	1 00
Ideal head in water color, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. C. M. Leet, Indianapolis	1 00
Ideal figure in oil, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. W. F. Jenkins, Indianapolis	1 00
Ideal figure in crayon, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Ideal figure in water color, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. G. D. Busick, Kokomo, Ind	1 00
Specimen flowers in oil, copy, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. J. A. Williams, Indianapolis	1 00
Specimen flowers in oil, original, Belle Morgan, Indianapolis	2 00
Second, Minnie B. Akass, Indianapolis	1 00
Display flowers in oil, Belle Morgan, Indianapolis	4 00
Second, Mrs. Clinton Hall, Indianapolis	2 00

Specimen flowers in water color, copy, Mrs. Clinton Hall, Indianapolis	2 00
Second, James Richey, Indianapolis	1 00
Specimen flowers in water color, original, Belle Morgan, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Display flowers in water color, Minnie B. Akass, Indianapolis	4 00
Second, Mrs. Clinton Hall, Indianapolis	2 00
Specimen fruit or vegetable, oil, copy, Jas. Richey, Indianapolis	2 00
Second, Mrs. J. A. Williams, Indianapolis	1 00
Specimen fruit or vegetable, water colors, copy, Mrs. Clinton Hall, Indianapolis	2 00
Second, M. Perkins, Indianapolis	1 00
Specimen fruit or vegetable, oil, original, Mrs. Clinton Hall, Indianapolis	2 00
Second, C. Carriger, Indianapolis	1 00
Specimen fruit or vegetable, water colors, original, Mrs. Clinton Hall, Indianapolis	2 00
Second, M. Perkins, Indianapolis	1 00
Display fruit or vegetable, oil, Mrs. Clinton Hall, Indianapolis	4 00
Second, Mrs. C. Railsback, Indianapolis	2 00
Display fruit or vegetable, water color, Gertrude May, Indianapolis	4 00
Second, Mrs. Clinton Hall, Indianapolis	2 00
Specimen animal, oil, copy, M. Sanders, Terre Haute, Ind	2 00
Second, Minnie B. Akass, Indianapolis	1 00
Specimen animal, water color, copy, Minnie B. Akass, Indianapolis	2 00
Second, Jas. Richey, Indianapolis	1 00
Specimen game, oil, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Specimen game, water color, Mrs. Clinton Hall, Indianapolis	2 00
Second, Flossie Smith, Indianapolis	1 00
Specimen game, pastel, Mrs. Clinton Hall, Indianapolis	2 00
Specimen animal, oil, life, Mrs. Clinton Hall, Indianapolis	4 00
Second, Minnie B. Akass, Indianapolis	2 00
Specimen animal, water color, life, Mrs. Clinton Hall, Indianapolis	4 00
Second, Minnie B. Akass, Indianapolis	2 00
Specimen still life, oil, Mrs. C. Railsback, Indianapolis	2 00
Second, Mrs. C. M. Leet, Indianapolis	1 00
Specimen still life, water color, Alice Brown, Indianapolis	2 00
Second, Mrs. G. D. Busick, Kokomo, Ind	1 00
Specimen still life, pastel, Mrs. Clinton Hall, Indianapolis	2 00
Second, Mrs. H. F. Prince, Indianapolis	1 00
Specimen landscape, oil, Mrs. Clinton Hall, Indianapolis	2 00
Second, M. F. Gatch, Indianapolis	1 00
Specimen landscape, water color, Mrs. Wm. Welsch, Indianapolis	2 00

Second, M. Sanders, Terre Haute, Ind	1 00
Specimen landscape, pastel, Mrs. H. F. Prince, Indianapolis	2 00
Second, M. Sanders, Terre Haute, Ind	1 00
Display landscape paintings, Mrs. Clinton Hall, Indianapolis	4 00
Second, Minnie B. Akass, Indianapolis	2 00
Sketch from nature, oil, Mrs. C. Railsback, Indianapolis	2 00
Second, Mrs. C. Railsback, Indianapolis	1 00
Sketch from nature, water color, Mrs. J. E. Haffner, Muncie, Ind.	2 00
Second, Minnie B. Akass, Indianapolis	1 00
Sketch from nature, pastel, Mrs. J. E. Haffner, Muncie, Ind	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Spring scene, oil, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Spring scene, water color, Flossie Smith, Indianapolis	2 00
Second, Mrs. G. D. Busick, Kokomo, Ind	1 00
Summer scene, oil, Mrs. Clinton Hall, Indianapolis	2 00
Second, Minnie B. Akass, Indianapolis	1 00
Summer scene, water color, Mrs. Clinton Hall, Indianapolis	2 00
Second, Mrs. S. H. Shearer, Indianapolis	1 00
Autumn scene, oil, Jas. Richey, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Autumn scene, water color, Mrs. Clinton Hall, Indianapolis	2 00
Second, Minnie B. Akass, Indianapolis	1 00
Winter scene, oil, C. Carriger, Indianapolis	2 00
Second, Belle Morgan, Indianapolis	1 00
Winter scene, water color, Mrs. C. M. Leet, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Marine scene, oil, Lena Ingraham, Indianapolis	2 00
Second, C. Carriger, Indianapolis	1 00
Marine scene, water color, Mrs. Clinton Hall, Indianapolis	2 00
Second, Alice Brown, Indianapolis	1 00
Interior scene, oil, Minnie Akass, Indianapolis	2 00
Second, Mrs. C. Railsback, Indianapolis	1 00
Interior scene, water color, Mrs. Clinton Hall, Indianapolis	2 00
Second, Minnie Akass, Indianapolis	1 00
Specimen pen and ink sketch, Mrs. Clinton Hall, Indianapolis	2 00
Second, C. S. Perry, Indianapolis	1 00
Display pen and ink sketch, Minnie B. Akass, Indianapolis	4 00
Second, Lena Ingraham, Indianapolis	2 00
Specimen drawing, copy, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Specimen drawing, original, Minnie B. Akass, Indianapolis	2 00
Second, Lena Ingraham, Indianapolis	1 00
Display drawing, copy, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00

Display drawing, original, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. Clinton Hall, Indianapolis	1 00
Specimen drawing, fancy head or figure, Minnie B. Akass, Indianapolis	2 00
Second, Jas. Richey, Indianapolis	1 00
Drawing, outline map of Indiana, Minnie B. Akass, Indianapolis	2 00
Second, Mrs. G. McLeod, Cincinnati, Ohio	1 00
Drawing, outline map of United States, Minnie B. Akass, Indianapolis	2 00
Architectural drawing, original, Adam Kauffman, Scranton, Pa	2 00
Second, Lena Ingraham, Indianapolis	1 00
Mechanical drawing, Adam Kauffman, Scranton, Pa	2 00
Second, Mrs. Wm. Welsch, Indianapolis	1 00
Display, charcoal drawings, Lena Ingraham, Indianapolis	2 00
Second, Mrs. G. McLeod, Cincinnati, Ohio	1 00
Specimen painted on china, Dresden, Mrs. Jennie T. Brown, Indianapolis	2 00
Second, Mrs. Willis Fugate, Indianapolis	1 00
Display painting on china, Dresden, Miss Janie Greer, Indianapolis	4 00
Second, C. Carriger, Indianapolis	2 00
Specimen painting on china, royal Worcester, Mrs. Willis Fugate, Indianapolis	2 00
Second, Catherine Venn, Indianapolis	1 00
Specimen painting on china, clock, Miss Janie Greer, Indianapolis.	2 00
Specimen painting in china, relief gold, Miss Janie Greer, Indianapolis	2 00
Second, M. Sanders, Terre Haute, Ind	1 00
Specimen painting on china, enamel, M. Sanders, Terre Haute, Ind.	2 00
Second, Mrs. E. H. Meyer, Indianapolis	1 00
Specimen painting on china, punch bowl, Mrs. J. E. Haffner, Muncie, Ind	4 00
Second, Catherine Venn, Indianapolis	2 00
Display painting on china, ornamental, Mrs. G. D. Busick, Kokomo, Ind	4 00
Second, Miss Janie Greer, Indianapolis	2 00
Display painting on china, original, flowers, C. Carriger, Indianapolis	4 00
Second, Mrs. E. P. Thayer, Greenfield	2 00
Specimen painting on china, doulton, Mrs. Willis Fugate, Indianapolis	4 00
Second, Florence Baxter, Indianapolis	2 00
Painting on china, fruit set, Catherine Venn, Indianapolis	4 00
Second, Mrs. Willis Fugate, Indianapolis	2 00
Painting on china, chocolate set, Catherine Venn, Indianapolis	4 00

Second, Mrs. E. H. Meyer, Indianapolis	2 00
Painting on china, soup set, Mrs. E. P. Thayer, Greenfield, Ind.	4 00
Second. Mrs. Willis Fugate, Indianapolis	2 00
Painting on china, tea set, Florence Baxter, Indianapolis	4 00
Second, Miss Janie Greer, Indianapolis	2 00
Painting on china, pudding set, C. Carriger, Indianapolis	4 00
Second, Mrs. C. B. Burger, Indianapolis	2 00
Painting on china, manicure set, C. Carriger, Indianapolis	4 00
Second, Mrs. Willis Fugate, Indianapolis	2 00
Painting on china, ice cream set, Mrs. G. D. Busick, Kokomo, Ind.	4 00
Second, Mrs. Jennie T. Brown, Indianapolis	2 00
Painting on china, jardiniere, Miss Janie Greer, Indianapolis	4 00
Second, Mrs. E. P. Thayer, Greenfield, Ind	2 00
Painting on china, ideal head or figure, M. Sanders, Terre Haute, Ind.	2 00
Second, Mrs. E. H. Meyer, Indianapolis	1 00
Painting on china, figure, Catherine Venn, Indianapolis	2 00
Second, Mrs. G. D. Busick, Kokomo, Ind	1 00
Painting on china, portrait, Miss A. Sloan, Indianapolis	4 00
Second, Mrs. E. H. Meyer, Indianapolis	2 00

CLASS XLIX—Art Work, Professional.

(Mrs. S. B. Alford, Peru, Ind., Judge.)

Portrait in oil, Mrs. E. M. Ingraham, Indianapolis	$15 00
Second, Gwynne C. Price, Chicago	8 00
Portrait in water color, Mrs. E. M. Ingraham, Indianapolis	10 00
Second, Anna Knubbe, Indianapolis	5 00
Portrait in crayon, Mrs. J. O. Spahr, Indianapolis	6 00
Second, Anna Knubbe, Indianapolis	3 00
Portrait in pastel. Mrs. John O. Spahr, Indianapolis	10 00
Second, Mrs. Maria Folger, Indianapolis	5 00
Ideal head, oil, Mrs. E. M. Ingraham, Indianapolis	6 00
Second, Mrs. John O. Spahr, Indianapolis	3 00
Ideal head, water color, Anna Knubbe, Indianapolis	4 00
Second, Anna Knubbe, Indianapolis	2 00
Ideal figure, oil, Gwynne C. Price, Chicago	6 00
Second, Mrs. John O. Spahr, Indianapolis	3 00
Ideal figure, water color, Mrs. E. M. Ingraham, Indianapolis	4 00
Second, Gwynne C Price, Chicago	2 00
Specimen flowers, oil, Mrs. E. M. Ingraham, Indianapolis	4 00
Second, Mrs. Marie Folger, Indianapolis	2 00
Display flowers, oil, Mrs. E. M. Ingraham, Indianapolis	6 00

Second, Retta Matthews, Arlington, Ind	3 00
Specimen flowers, water color, Miss Temple Tice, Indianapolis	4 00
Second, Mrs. Marie Folger, Indianapolis	2 00
Display flowers, water color, Imogene Brown, Crawfordsville, Ind.	6 00
Second, Mrs. E. M. Ingraham, Indianapolis	3 00
Specimen fruit or vegetable, oil, Mrs. Marie Folger, Indianapolis	4 00
Second, Gwynne C. Price, Chicago	2 00
Specimen fruit or vegetable, water color, Mrs. J. O. Spahr, Indianapolis	4 00
Second, Mrs. E. M. Ingraham, Indianapolis	2 00
Display fruit or vegetable, oil, Miss Retta Matthews, Arlington	4 00
Second, Mrs. E. M. Ingraham, Indianapolis	2 00
Display fruit or vegetable, water color, Mrs. E. M. Ingraham, Indianapolis	4 00
Second, Imogene Brown, Crawfordsville, Ind	2 00
Animal, oil, Mrs. E. M. Ingraham, Indianapolis	4 00
Second, Mrs. Marie Folger, Indianapolis	2 00
Animal, water color, Mrs. Marie Folger, Indianapolis	4 00
Second, Sue Ennis, Philo, Ill	2 00
Game, oil, Mrs. J. O. Spahr, Indianapolis	4 00
Second, Mrs. Marie Folger, Indianapolis	2 00
Game, water color, Mrs. J. O. Spahr, Indianapolis	4 00
Second, Mrs. Wm. Welsch, Indianapolis	2 00
Still life, oil, Mrs. E. M. Ingraham, Indianapolis	4 00
Second, Mrs. Marie Folger, Indianapolis	2 00
Still life, water color, Mrs. J. O. Spahr, Indianapolis	4 00
Second, Imogene Brown, Crawfordsville, Ind	2 00
Still life, pastel, Mrs. Marie Folger, Indianapolis	4 00
Specimen landscape, oil, P. Hall, Indianapolis	4 00
Second, Mrs. Marie Folger, Indianapolis	2 00
Specimen landscape, water color, Mrs. Marie Folger, Indianapolis	4 00
Second, Mrs. E. M. Ingraham, Indianapolis	2 00
Specimen landscape, pastel, Miss Alice Mitchell, New York City	4 00
Second, Gwynne C. Price, Chicago	2 00
Display paintings, P. Hall, Indianapolis	6 00
Second, Mrs. Retta Matthews, Arlington, Ind	3 00
Nature sketch, oil, Mrs. J. O. Spahr, Indianapolis	4 00
Second, Mrs. Marie Folger, Indianapolis	2 00
Nature sketch, water color, Mrs. J. O. Spahr, Indianapolis	4 00
Second, P. Hall, Indianapolis	2 00
Nature sketch, pastel, Mrs. Marie Folger, Indianapolis	4 00
Second, Miss Alice Mitchell, New York city	2 00
Nature sketch, crayon, Mrs. E. M. Ingraham, Indianapolis	4 00
Second, Mrs. J. O. Spahr, Indianapolis	2 00
Nature sketch, display, Mrs. Marie Folger, Indianapolis	6 00

Second, Mrs. E. M. Ingraham, Indianapolis	3 00
Interior scene, oil, Mrs. E. M. Ingraham, Indianapolis	4 00
Second, Gwynne C. Price, Chicago	2 00
Drawing from antique head, Minnie Hines, Indianapolis	4 00
Second, Miss Retta Matthews, Arlington, Ind	2 00
Drawing from antique figure, Miss Retta Matthews, Arlington, Ind	4 00
Second, Mrs. J. O. Spahr, Indianapolis	2 00
Drawing, animal, Minnie B. Akass, Indianapolis	4 00
Second, Mrs. J. O. Spahr, Indianapolis	2 00
Drawing, architectural, Mrs. J. E. Haffner, Muncie, Ind	4 00
Second, Mrs. E. M. Ingraham, Indianapolis	2 00
Drawing, mechanical, H. C. Westfall, Terre Haute, Ind	4 00
Second, H. C. Westfall, Terre Haute, Ind	2 00
Drawing, pen and ink, C. S. Perry, Indianapolis	4 00
Second, Mrs. E. M. Ingraham, Indianapolis	2 00
Wash drawing, Minnie B. Akass, Indianapolis	4 00
Second, Mrs. E. M. Ingraham, Indianapolis	2 00
Drawing from life, charcoal, Imogene Brown, Crawfordsville, Ind.	3 00
Second, Sue Ennis, Philo, Ill	2 00
Illustrated poem, Mrs. H. F. Prince, Indianapolis	8 00
Second, Minnie B. Akass, Indianapolis	4 00
Painting on china, flower plates, M. I. Julian, Indianapolis	3 00
Second, Mrs. Lura C. Davis, Columbus, Ohio	2 00
Painting on china, Dresden, Mrs. S. J. Greenleaf, Hagerstown, Ind.	4 00
Second, M. I. Julian, Indianapolis	2 00
Painting on china, display, Mrs. S. J. Greenleaf, Hagerstown, Ind.	4 00
Second, Mrs. Wm. C. Welsch, Indianapolis	2 00
Painting on china, royal Worcester, M. I. Julian, Indianapolis	4 00
Second, Mrs. W. S. Day, Indianapolis	2 00
Painting on china, lamp, M. I. Julian, Indianapolis	4 00
Second, Mrs. Wm. C. Welsch, Indianapolis	2 00
Painting on china, ornamental, Mrs. M. E. Chance, Alpine, Ind	4 00
Second, M. I. Julian, Indianapolis	2 00
Painting on china, flowers, Mrs. Lura C. Davis, Columbus, Ohio	4 00
Second, Mrs. W. S. Day, Indianapolis	2 00
Painting on china, relief gold, M. I. Julian, Indianapolis	4 00
Second, Sue Ennis, Philo, Ill	2 00
Painting on china, Doulton, Miss A. Sloan, Indianapolis	4 00
Second, Mrs. S. J. Greenleaf, Hagerstown, Ind	2 00
Painting on china, enamel, M. I. Julian, Indianapolis	4 00
Second, Mrs. W. S. Day, Indianapolis	2 00
Painting on china, clock, Mrs. Lura C. Davis, Columbus, Ohio	4 00
Second, M. I. Julian, Indianapolis	2 00
Painting on china, coal port, Mrs. J. E. Heffner, Muncie, Ind	4 00

Second, Miss A. Sloan, Indianapolis	2 00
Painting on china, chocolate set, Mrs. W. S. Day, Indianapolis	6 00
Second, Mrs. Wm. H. Welsch, Indianapolis	3 00
Painting on china, fruit set, Mrs. J. E. Heffner, Muncie, Ind	**6 00**
Second, Mrs. Wm. H. Welsch, Indianapolis	**3 00**
Painting on china, pudding set, Mrs. S. J. Greenleaf, Hagerstown, Ind	6 00
Second, Mrs. Wm. H. Welsch, Indianapolis	3 00
Painting on china, soup set, Sue Ennis, Philo, Ill	6 00
Second, Mrs. Lura C. Davis, Columbus, Ohio	3 00
Painting on china, manicure set, M. I. Julian, Indianapolis	6 00
Second, Mrs. M. E. Chance, Alpine, Ind	3 00
Painting on china, ice cream set, M. E. McKee, Indianapolis	6 00
Second, M. I. Julian, Indianapolis	3 00
Painting on china, punch bowl, Mrs. W. S. Day, Indianapolis	4 00
Second, Mrs. Wm. H. Welsch, Indianapolis	2 00
Painting on china, jardiniere, M. I. Julian, Indianapolis	4 00
Second, Miss A. Sloan, Indianapolis	2 00
Painting on china, conventional, Mrs. Lura C. Davis, Columbus, Ohio	4 00
Second, M. I. Julian, Indianapolis	2 00
Painting on china, ideal head, Mrs. Wm. C. Welsch, Indianapolis	4 00
Second, Mrs. W. S. Day, Indianapolis	2 00
Painting on china, figure, Mrs. W. S. Day, Indianapolis	4 00
Second, Miss A. Sloan, Indianapolis	2 00
Painting on china, portrait, Sue Ennis, Philo, Ill	4 00
Second, Sisters of St. Francis, Indianapolis	2 00
Painting on china, display, M. I. Julian, Indianapolis	10 00
Second, Mrs. J. E. Heffner, Muncie, Ind	5 00
Display paintings, not china, Mrs. E. M. Ingraham, Indianapolis	10 00
Second, Mrs. J. O. Spahr, Indianapolis	5 00
Display paintings, water colors, Mrs. E. M. Ingraham, Indianapolis	10 00
Second, Mrs. J. O. Spahr, Indianapolis	5 00

CLASS L—Table Luxuries.

(Mrs. Sarah B. Alford, Judge.)

Maple syrup, Frank Johnson, Howlands, Ind	$2 00
Second, Mrs. J. B. Powers, Indianapolis	1 00
Maple sugar, Mrs. P. D. Stagg, Greensburg, Ind	2 00
Second, N. Y. Hutchings, Indianapolis	1 00
Wheat bread, yeast, Mrs. M. A. Johnson, Indianapolis	1 50
Second, Sarah H. Clark, Indianapolis	75
Wheat bread, salt rising, Mrs. L. E. Newsom, Indianapolis	1 50

Second. H. Jeffries, Franklin, Ind	75
Graham bread, Mrs. O. C. McGannon, Indianapolis	1 50
Second. Mrs. O. C. McGannon, Indianapolis	75
Boston brown bread, Mrs. Willis Fugate, Indianapolis	1 50
Second, Mrs. W. S. Hoss, West Indianapolis	75
Rusk, Mrs. G. C. Sands, Kokomo, Ind	1 50
Second. Mrs. O. C. McGannon, Indianapolis	75
Corn pone, Miss Florence Blue, Mapleton	1 50
Second, Mrs. G. C. Sands, Kokomo, Ind	75
Dozen rolls, Laura B. Staats, Indianapolis	1 50
Second, Mrs. O. C. McGannon, Indianapolis	75
Gingerbread, Mrs. G. C. Sands, Kokomo, Ind	1 50
Second. Mrs. J. B. Powers, Indianapolis	75
Fig cake, L. B. Hoover, Indianapolis	1 50
Second. Rebecca Hessong, Ripple, Ind	75
Caramel cake, orange flavor, Mrs. G. C. Sands, Kokomo, Ind	1 50
Second. Rebecca Hessong, Ripple, Ind	75
Caramel cake, chocolate flavor, Mrs. C. H. Marshall, Crawfordsville, Ind	1 50
Second. Rebecca Hessong, Ripple, Ind	75
Angel food, Daisy Davenport, Indianapolis	1 50
Second. Miss A. Sloan, Indianapolis	75
Hickorynut cake, A. J. Voris, Indianapolis	1 50
Second, Katie Lauer, Indianapolis	75
Imperial cake, Mrs. W. S. Hoss, West Indianapolis	1 50
Second. Rebecca Hessong, Ripple, Ind	75
Fruit cake, Mrs. O. C. McGannon, Indianapolis	3 00
Second, Jessie Bennet, Indianapolis	2 00
White fruit cake, Mrs. V. L. Wilson, Knightstown, Ind	1 50
Second, Mrs. G. C. Sands, Kokomo, Ind	75
White cake, Mercy M. Moore, Indianapolis	1 50
Second, Mrs. O. C. McGannon, Indianapolis	75
Chocolate cake, layer, Beatrice Mockford, Indianapolis	2 00
Second, Mrs. E. H. Brouse, Indianapolis	1 00
Chocolate cake, loaf, Mrs. Bert Boyd, Indianapolis	2 00
Second, L. B. Hoover, Indianapolis	1 00
Perfection cake, Mrs. J. B. Powers, Indianapolis	1 50
Second, Mrs. G. C. Sands, Kokomo, Ind	75
Crullers, Mrs. J. B. Powers, Indianapolis	1 50
Second, Katie Lauer, Indianapolis	75
Cream puffs, Mrs. J. B. Powers, Indianapolis	1 50
Second. Mrs. Hollingsworth, Indianapolis	75
Cookies, Mrs. Betty Clore, Bargersville, Ind	1 50
Cookies, Mrs. Betty Clore, Burgersville, Ind	1 50
Second, Mrs. Annie Tucker, Indianapolis	75

Kisses, Mrs. Mollie Walters, Emerich Mills	1 50
Second, L. B. Hoover, Indianapolis	75
Meringues, Mrs. Hollingsworth, Indianapolis	1 50
Second, Mrs. H. F. Prince, Indianapolis	75
English plumb pudding, Mrs. Chas. Nye, Indianapolis	1 50
Second, Mrs. Hollingsworth, Indianapolis	75
Collection jellies, Mrs. V. L. Wilson, Knightstown, Ind	3 00
Second, N. Y. Hutchings, Indianapolis	2 00
Collection preserves, Mrs. V. L. Wilson, Knightstown, Ind	3 00
Collection canned fruit, Mrs. V. L. Wilson, Knightstown, Ind	5 00
Second, N. Y. Hutchings, Indianapolis	3 00
Meat salad, Ze Ruey Griffey, Indianapolis	1 50
Second, Katie Lauer, Indianapolis	75
Fish salad, Mrs. H. C. Roney, Indianapolis	1 50
Second, Emily J. Jackson, Mapleton, Ind	75
Vegetable salad, Mrs. H. C. Roney, Indianapolis	1 50
Second, Mrs. J. B. Powers, Indianapolis	75
Cheese straws, H. Jeffrey, Franklin, Ind	1 00
Second, Mrs. V. L. Wilson, Knightstown, Ind	50
Saratoga chips, Emily J. Jackson, Mapleton, Ind	1 00
Second, Mrs. V. L. Wilson, Knightstown, Ind	50
Veal loaf, Mrs. Annie Tucker, Indianapolis	1 50
Second, Mrs. I. M. Porter, Indianapolis	75
Beef loaf, Mrs. W. B. Flick, Lawrence, Ind	1 50
Second, Mrs. Mollie Walters, Emerich Mills, Ind	50
Spiced cherries, Rosa Estes, Indianapolis	1 50
Second, Mrs. W. S. Hess, West Indianapolis	75
Collection sweet pickles, Mrs. V. L. Wilson, Knightstown, Ind	1 50
Second, Rosa Estes, Indianapolis	75
Mixed pickles, Mrs. V. L. Wilson, Knightstown, Ind	1 50
Second, Mrs. W. S. Hoss, West Indianapolis	75
Cucumber pickles, Mrs. Annie Tucker, West Indianapolis	1 50
Second, Miss Florence Blue, Mapleton, Ind	75
Peach pickles, Gertrude Sargent, Lawrence, Ind	2 00
Second, L. B. Hoover, Indianapolis	1 00
Pear pickles, Mrs. Betty Clore, Bargersville, Ind	2 00
Second, L. B. Hoover, Indianapolis	1 00
Tomato catsup, Mrs. Betty Clore, Bargersville, Ind	1 00
Second, L. B. Hoover, Indianapolis	50
Cucumber catsup, Mrs. Annie Tucker, Indianapolis	1 00
Second, Rebecca Hessong, Ripple, Ind	50
Chili sauce, Mrs. M. E. Hill, Indianapolis	1 00
Second, Mrs. I. M. Porter, Indianapolis	50
Boston baked beans, Mrs. Fannie Hamilton, Elwood, Ind	1 00
Second, Mrs. Fannie Hamilton, Elwood, Ind	50

Cranberry sauce, Mrs. Hollingsworth, Indianapolis	1 00
Second, Mrs. Annie Tucker, Indianapolis	50
Gelatine, any form, Mrs. J. B. Powers, Indianapolis	1 50
Second, Mrs. Hollingsworth, Indianapolis	75
Collection French candies, Mrs. C. H. Marshall, Crawfordsville	1 50
Second, Mrs. M. A. Johnson, Indianapolis	75
Collection taffies, Mrs. J. B. Powers, Indianapolis	1 50
Second, Mrs. Hollingsworth, Indianapolis	75

CLASS LI—Children's Department.

(Jessie Moore, Judge.)

Hand-made garment, Miss Helen Rochester, Quincy, Ill	$1 50
Second, S. E. Jackson, Bennington, Ind	75
Cotton embroidery, Nina Carter, Indianapolis	1 50
Second, Ivy Huchings, Indianapolis	75
Silk embroidery, Eva Borst, Kokomo, Ind	1 50
Second, Bessie Argedine, Indianapolis	75
Dressed doll, Orvin Porter, Indianapolis	1 50
Second, Marie Williams, Indianapolis	75
Crochet work, Anna Thornburg, Indianapolis	1 50
Second, Tiny Reel, Indianapolis	75
Crochet skirt, S. E. Jackson, Bennington, Ind	1 50
Second, Cassie Dille, Greensburg, Ind	75
Crochet mittens, Jessie Bennett, Indianapolis	1 50
Second, Helen Rochester, Quincy, Ill	75
Crochet tidy, Bessie Argedine, Indianapolis	1 50
Second, Ivy Huchings, Indianapolis	75
Pin cushion, Nina Carter, Indianapolis	1 50
Second, Tiny Reel, Indianapolis	75
Dresser or bureau set, Lula Hoss, West Indianapolis	1 50
Second, Imogene Hoss, West Indianapolis	75
Fancy sachet, Anna Thornburg, Indianapolis	1 50
Second, Cassie Dille, Greensburg, Ind	75
Scrap book, Lula Hoss, West Indianapolis	1 50
Second, Fred Dickson, Indianapolis	75
Painting on silk or satin, Bertha Jackson, Mapleton, Ind	1 50
Second, Jessie Bennett, Indianapolis	75
Painting on wood, Bessie Argedine, Indianapolis	1 50
Second, Nina Carter, Indianapolis	75
Flower painting, Flossie Smith, Indianapolis	1 50
Second, Bessie Argedine, Indianapolis	75
Study from still life, Flossie Smith, Indianapolis	1 50
Second, Flossie Smith, Indianapolis	75

Study from life, Nina Carter, Indianapolis	1 50
Second, Nina Carter, Indianapolis	75
Drawing, original, Fred Dickson, Lawrence, Ind	1 50
Second, Ivy Hutchings, Indianapolis	75
Drawing, copy, Herbert Summers, Indianapolis	1 50
Second, Imogene Hoss, West Indianapolis	75
Display crayon drawings, Flossie Smith, Indianapolis	2 00
Specimen crayon drawings, Nina Carter, Indianapolis	1 50
Second, Eva Borst, Kokomo, Ind	75
Conventional design, Nina Carter, Indianapolis	1 50
Second, Imogene Hoss, West Indianapolis	75
Modeling in clay, Lula Hoss, West Indianapolis	1 50
Wood carving, Fred Dickson, Lawrence, Ind	1 50
Second, Eva Borst, Indianapolis	75
Collection of woods, Eva Borst, Indianapolis	1 50
Second, Nina Carter, Indianapolis	75
Collection of minerals, Eva Borst, Indianapolis	3 00
Collection of curiosities, Sylvester Johnson, Jr., Indianapolis	2 00
Second, Fred Dickson, Lawrence, Ind	1 00
Collection old coins, Nina Carter, Indianapolis	2 00
Collection stamps, Donald H. Ely, Indianapolis	3 00
Second, Raymond Blatchley, Indianapolis	2 00

Respectfully submitted,

JAMES E. McDONALD,
Superintendent.

REPORT OF AGRICULTURAL DEPARTMENT.

Mr. President and Gentlemen of the Delegate Board of Indiana—I have the honor of submitting to you my report of this Department for the year 1897. In this Department there was the largest number of exhibits in the history of the Fair, being as follows:

Class 34.	Grain and seeds entries	350
Class 35.	Vegetables entries	282
Class 36.	Root crops entries	165
Class 37.	Potatoes entries	139
	Total entries	936

This being an increase of entries over last year of 232.

There was never a finer display of exhibits in this Department, and I am glad to note that there is an increased interest manifested each year among the exhibitors, and with this in view I would recommend that the shelving around the wall, which is made of rough lumber and not painted, be taken out and replaced with dressed lumber, and that they be painted, as it will save quite an expense each year in papering. I feel it my duty to again call the attention of the Board to the condition of the roof of the Agricultural Hall, as it leaks badly; also that the flagstaffs should be more firmly secured and fastened in their places, one of them having fallen down at the last Fair.

AWARDS.

CLASS XXXIV—Grain and Seeds.

(Robert Mitchell, Judge.)

Twenty ears yellow corn, J. D. Whitesides, Franklin, Ind	$5 00
Second, S. B. Clore, Franklin, Ind	2 00
Twenty ears white corn, J. D. Whitesides, Franklin, Ind	5 00
Second, F. M. Sanford, Philadelphia, Ind	2 00
Twenty ears corn any other color, J. D. Whitesides, Franklin, Ind.	5 00
Second, F. M. Sanford, Philadelphia, Ind	2 00
Twenty ears hominy corn, J. D. Whitesides, Franklin, Ind	5 00
Second, John Marvel, Royalton, Ind	2 00
Peck white pop corn, J. D. Whitesides, Franklin, Ind	2 00
Second, John Marvel, Royalton, Ind	1 00
Peck red pop corn, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Peck pop corn, any other variety, John Marvel, Royalton, Ind	2 00
Second, John Marvel, Royalton, Ind	2 00
Display corn, S. B. Clore, Franklin, Ind	20 00
Second, J. D. Whitesides, Franklin, Ind	10 00
Half bushel white wheat, J. L. Keckley, Maysville, O	5 00
Second, F. M. Whipps, Byhalia, O	2 00
Half bushel red wheat, J. L. Keckley, Maysville, O	5 00
Second, S. B. Clore, Franklin, Ind	2 00
Half bushel amber wheat, J. L. Keckley, Maysville, O	5 00
Second, J. L. Keckley, Maysville, O	2 00
Display wheat, John Marvel, Royalton, Ind	10 00
Second, D. F. Corwin, Springboro, O	5 00
Display grain in straw, D. F. Corwin, Springboro, O	5 00
Second, John Marvel, Royalton, Ind	2 00
Half bushel rye, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Half bushel white oats, J. L. Keckley, Maysville, O	2 00

Second, J. L. Keckley, Maysville, O	1 00
Half bushel mixed oats, F. M. Sanford, Philadelphia, Ind	2 00
Second, J. L. Keckley, Maysville, O	1 00
Half bushel buckwheat, J. L. Keckley, Maysville, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Half bushel barley, J. L. Keckley, Maysville, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Half bushel flaxseed, J. L. Keckley, Maysville, O	2 00
Second, W. A. Ennis, Clermont, Ind	1 00
Half bushel German millet, F. M. Whipps, Byhalia, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Half bushel timothy, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Half bushel orchard grass seed, F. M. Whipps, Byhalia, O	2 00
Second, John Marvel, Royalton, Ind	1 00
Half bushel Hungarian seed, J. L. Keckley, Maysville, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Half bushel Kentucky blue grass seed, J. L. Keckley, Maysville, O.	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Half bushel English blue grass seed, W. A. Ennis, Clermont, Ind.	2 00
Second, John Marvel, Royalton, Ind	1 00
Half bushel lawn grass seed, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Half bushel red clover seed, John Marvel, Royalton, Ind	2 00
Second, S. B. Clore, Franklin, Ind	1 00
Half bushel English clover seed, John Marvel, Royalton, Ind	2 00
Second, F. M. Sanford, Philadelphia, Ind	1 00
Ten lbs. broom corn, W. A. Ennis, Clermont, Ind	2 00
Second, John Marvel, Royalton, Ind	1 00
Collection grain and seeds, J. L. Keckley, Maysville, O	10 00
Second, John Marvel, Royalton, Ind	5 00
Collection products by county society, J. D. Whitesides, Franklin.	50 00
Second, John Marvel, Royalton, Ind	25 00
Collection grasses, D. F. Corwin, Springboro, O	Dip.

CLASS XXXV—Vegetables.

(Robert Mitchell, Judge.)

Six cauliflowers, Chas. E. Becker, Mapleton, Ind	$2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Six egg plants, Chas. E. Becker, Mapleton, Ind	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Twelve cucumbers, Chas. E. Becker, Mapleton, Ind	2 00
Second, J. D. Whitesides, Franklin, Ind	1 00

Peck white beans, John Marvel, Royalton, Ind	2 00
Second, J. W. Robey, Sabine, Ind	1 00
Peck white navy beans, F. M. Sanford, Philadelphia, Ind	2 00
Second, John Marvel, Royalton, Ind	1 00
Peck colored beans, J. L. Keckley, Maysville, Ind	2 00
Second, W. A. Ennis, Clermont, Ind	1 00
Peck Lima beans, John Marvel, Royalton, Ind	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Peck white kidney beans, John Marvel, Royalton, Ind	2 00
Second, J. L. Keckley, Maysville, O	1 00
Peck field peas, D. F. Corwin, Springboro, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Peck garden peas, John Marvel, Royalton, Ind	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Peck peppers, John Marvel, Royalton, Ind	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Peck tomatoes, Chas. E. Becker, Mapleton, Ind	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Collection tomatoes, Chas. E. Becker, Mapleton, Ind	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Twelve ears sweet corn, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Twelve ears dry sweet corn, S. B. Clore, Franklin, Ind	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Three Hubbard squashes, F. M. Whipps, Byhalia, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Three Marblehead squashes, W. A. Ennis, Clermont, Ind	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Three California squashes, F. M. Whipps, Byhalia, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Largest pumpkin, F. M. Sanford, Philadelphia, Ind	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Three field pumpkins, H. A. Maker, Carmel, Ind	2 00
Second, H. A. Maker, Carmel, Ind	1 00
Largest squash, Sylvester Johnson, Jr., Indianapolis	2 00
Second, Sylvester Johnson, Irvington, Ind	1 00
Six drumhead cabbage, D. F. Elwanger, Haughville, Ind	2 00
Second, John Marvel, Royalton, Ind	1 00
Six flathead cabbage, D. F. Elwanger, Haughville, Ind	2 00
Second, John Marvel, Royalton, Ind	1 00
Six cabbage any other kind, F. M. Whipps, Byhalia, O	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Twelve stalks celery, D. F. Elwanger, Haughville, Ind	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Display celery, Chas. E. Becker, Mapleton, Ind	3 00

Second, D. F. Elwanger, Haughville, Ind	2 00
Collection vegetables, Chas. E. Becker, Mapleton, Ind	10 00
Second, D. F. Elwanger, Haughville, Ind	5 00
Six watermelons, D. F. Elwanger, Haughville, Ind	3 00
Second, F. M. Whipps, Byhalia, O	2 00
Six nutmeg melons, D. F. Elwanger, Haughville, Ind	3 00
Second, Chas. E. Becker, Mapleton, Ind	2 00
Largest gypsy melon, J. S. Duckwell, Indianapolis	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Largest icing melon, F. M. Whipps, Byhalia, O	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Largest Sweetheart melon, D. F. Elwanger, Haughville, Ind	2 00
Second, W. A. Ennis, Clermont, Ind	1 00
Display muskmelons, Chas. E. Becker, Mapleton, Ind	3 00
Second, D. F. Elwanger, Haughville, Ind	2 00
Collection melons, Chas. E. Becker, Mapleton, Ind	5 00

CLASS XXXVI—Root Crops.

(Robert Mitchell, Judge.)

Peck turnips, W. A. Ennis, Clermont, Ind	$2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Peck parsnips, F. M. Whipps, Byhalia, O	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Peck carrots, Sylvester Johnson, Irvington, Ind	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Peck carrots, for table use, J. D. Whitesides, Franklin, Ind	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Twelve roots salsify, Chas. E. Becker, Mapleton, Ind	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Twelve roots horseradish, Chas. E. Becker, Mapleton, Ind	2 00
Second, D. F. Elwanger, Haughville, Ind	1 00
Twelve long red beets, F. M. Whipps, Byhalia, O	2 00
Second, J D. Whitesides, Franklin, Ind	1 00
Twelve turnip beets, D. F. Elwanger, Haughville, Ind	2 00
Second, John Marvel, Royalton, Ind	1 00
Twelve sugar beets, F. M. Whipps, Byhalia, O	2 00
Second, Harry Bennett, Franklin, Ind	1 00
Display sugar beets, J. D. Whitesides, Franklin, Ind	3 00
Second, J. L. Keckley, Maysville, O	2 00
Twelve mangelwurzel, Sylvester Johnson, Irvington, Ind	2 00
Second, J. D. Whitesides, Franklin, Ind	1 00
Peck red onions, J. L. Keckley, Maysville, O	2 00
Second, J. D. Whitesides, Franklin, Ind	1 00

Peck yellow onions, J. D. Whitesides, Franklin, Ind	2 00
Second, J. L. Keckley, Maysville, O	1 00
Peck white onions, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Gallon onion sets, J. D. Whitesides, Franklin, Ind	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Gallon white onion sets, D. F. Elwanger, Haughville, Ind	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Display onions, Chas. E. Becker, Mapleton, Ind	3 00
Second, F. M. Whipps, Byhalia, O	2 00
Dozen turnip radishes, J. D. Whitesides, Franklin, Ind	1 00
Second, Chas. E. Becker, Mapleton, Ind	50
Dozen long radishes, Chas. E. Becker, Mapleton, Ind	1 00
Second, J. D. Whitesides, Franklin, Ind	50
Dozen radishes any other kind, J. D. Whitesides, Franklin, Ind	1 00
Second, Chas. E. Becker, Mapleton, Ind	50
Collection root crop, Chas. E. Becker, Mapleton, Ind	5 00
Second, D. F. Elwanger, Haughville, Ind	3 00

CLASS XXXVII—Potatoes.

(Robert Mitchell, Judge.)

Peck Early Rose, Harry Bennett, Franklin, Ind	$2 00
Second, J. L. Keckley, Maysville, O	1 00
Peck Early Ohio, Harry Bennett, Franklin, Ind	2 00
Second, J. D. Whitesides, Franklin, Ind	1 00
Peck Beauty of Hebron, J. D. Whitesides, Franklin, Ind	2 00
Second, Harry Bennett, Franklin, Ind	1 00
Peck Burbank Seedling, F. M. Whipps, Byhalia, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Peck Green Mountain, J. L. Keckley, Maysville, O	2 00
Second, J. D. Whitesides, Franklin, Ind	1 00
Peck Bliss's Triumph, J. D. Whitesides, Franklin, Ind	2 00
Second, J. L. Keckley, Maysville, O	1 00
Peck White Star, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Peck World's Fair, F. M. Whipps, Byhalia, O	2 00
Second, J. L. Keckley, Maysville, O	1 00
Peck Carmen No. 1, J. L. Keckley, Maysville, O	2 00
Second, Harry Bennett, Franklin, Ind	1 00
Peck New Queen, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Peck Maggie Murphy, J. D. Whitesides, Franklin, Ind	2 00
Second, J. L. Keckley, Maysville, O	1 00

Peck Early Harvest, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Peck any other variety, J. L. Keckley, Maysville, O	2 00
Second, F. M. Whipps, Byhalia, O	1 00
Collection Irish potatoes, J. L. Keckley, Maysville, O	10 00
Second, F. M. Whipps, Byhalia, O	5 00
Peck yellow sweet potatoes, D. F. Elwanger, Haughville, Ind	2 00
Second, Chas. E. Becker, Mapleton, Ind	1 00
Peck red sweet potatoes, J. D. Whitesides, Franklin, Ind	2 00
Second, John Marvel, Royalton, Ind	1 00
Collection sweet potatoes, Chas. E. Becker, Mapleton, Ind	5 00
Second, John Marvel, Royalton, Ind	3 00

Respectfully submitted,

JOHN L. DAVIS,
Superintendent.

REPORT OF THE HORTICULTURAL DEPARTMENT.

The following entries were made:

In Class 38, fruit	749
In Class 39, flowers, professional	24
In Class 40, flowers, amateur	57
In Class 41, bees and honey	63
Total number of entries	895

Total expense of the Department, $56.

AWARDS.

CLASS XXXVIII—Fruits.

(W. H. Ragen, Judge.)

APPLES.

Fifteen varieties for home use, D. F. Corwin, Springboro, O	$10 00
Second, J. J. Vance, Springport, Ind	6 00
Ten varieties for market, J. J. Vance, Springport, Ind	8 00

Second, D. F. Corwin, Springboro, O.	5 00
Five varieties for culinary, Joe A. Burton, Orleans, Ind.	4 00
Second, H. D. Brubaker, Ridgeway, Ind.	2 00
Plate Maiden Blush, E. A. Robison, Rocklane, Ind.	1 50
Second, W. B. Flick, Lawrence, Ind.	1 00
Plate Smith Cider, N. E. Woods, Pecksburg, Ind.	1 50
Second, W. F. Sayler, Newmarket, Ind.	1 00
Plate Ben Davis, W. B. Flick, Lawrence, Ind.	1 50
Second, H. D. Brubaker, Ridgeway, Ind.	1 00
Plate Roman Beauty, Joe A. Burton, Orleans, Ind.	1 50
Second, N. E. Woods, Pecksburg, Ind.	1 00
Plate Winesap, Joe A. Burton, Orleans, Ind.	1 50
Second, J. W. Demeree, Budd, Ind.	1 00
Plate Rambo, E. A. Robison, Rocklane, Ind.	1 50
Second, Gertrude Sargent, Lawrence, Ind.	1 00
Plate Yellow Bellflower, J. D. Whitesides, Franklin, Ind.	1 50
Second, J. J. Vance, Springport, Ind.	1 00
Plate Fall Pippen, D. F. Corwin, Springboro, O.	1 50
Second, E. A. Robison, Rocklane, Ind.	1 00
Plate Willow Twig, J. J. Vance, Springport, Ind.	1 50
Second, D. F. Corwin, Springboro, O.	1 00
Plate Newton Spitzenberg, Mary J. Flick, Lawrence, Ind.	1 50
Second, no award.	1 00
Plate Westfield, J. J. Vance, Springport, Ind.	1 50
Second, W. B. Flick, Lawrence, Ind.	1 00
Plate Wagener, not awarded.	1 50
Second, D. F. Corwin, Springboro, O.	1 00
Plate Gravenstein, J. J. Vance, Springport, Ind.	1 50
Second, no award.	1 00
Plate Red Beitigheimer, L. M. Gregg, Springboro, O.	1 50
Second; no award.	1 00
Plate Fameuse or Snow, Roy Hindman, Lawrence, Ind.	1 50
Second, J. J. Vance, Springport, Ind.	1 00
Plate Moore's Sweet, no award.	
Second, Roy Hindman, Lawrence, Ind.	1 00
Plate Thompkins' Sweet, J. J. Vance, Springport, Ind.	1 50
Second, E. A. Robison, Rocklane, Ind.	1 00
Plate Hubbardson, no award.	1 50
Second, no award.	1 00
Plate Peck's Pleasant, no award.	1 50
Second, no award.	1 00
Plate Red Canada, D. F. Corwin, Springboro, O.	1 50
Second, L. M. Gregg, Springboro, O.	1 00
Plate Rhode Island Greening, H. D. Brubaker, Ridgeway, Ind.	1 50
Second, D. F. Corwin, Springboro, O.	1 00

Plate Clayton, W. B. Flick, Lawrence, Ind	1 50
Plate White Pippin, J. J. Vance, Springport, Ind	1 50
Second, N. E. Woods, Pecksburg, Ind	1 00
Plate Baldwin, Frank Cole, Franklin, Ind	1 50
Second, D. F. Corwin, Springboro, O	1 00
Plate York Imperial, D. F. Corwin, Springboro, O	1 50
Second, L. M. Gregg, Springboro, O	1 00
Plate Northern Spy, N. E. Woods, Pecksburg, Ind	1 50
Second, J. W. Daubenspeck, Mattsville, Ind	1 00
Plate Grimes Golden, Joe A. Burton, Orleans, Ind	1 50
Second, E. A. Robison, Rocklane, Ind	1 00
Plate Roman Stem, W. B. Flick, Lawrence, Ind	1 50
Second, Mrs. W. B. Flick, Lawrence, Ind	1 00
Plate Indiana Favorite, John A. Heavenridge, Liberty, Ind	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate Belmont, D. F. Corwin, Springboro, O	1 50
Second, L. M. Gregg, Springboro, O	1 00
Plate Jonathan, J. W. Demeree, Budd, Ind	1 50
Second, D. F. Corwin, Springboro, O	1 00
Plate Lansingberg, no award	1 50
Second, John A. Heavenridge, Liberty, Ind	1 00
Plate Talman Sweet, J. J. Vance, Springport, Ind	1 50
Second, W. B. Flick, Lawrence, Ind	1 00
Plate Vandever, J. W. Demeree, Budd, Ind	1 50
Second, G. A. Stanton, Greenwood, Ind	1 00
Plate Twenty Ounce, John Heavenridge, Liberty, Ind	1 50
Second, D. F. Corwin, Springboro, O	1 00
Plate Ralls Sweet, Joe A. Burton, Orleans, Ind	1 50
Second, J. W. Demeree, Budd, Ind	1 00
Plate Wealthy, J. D. Whitesides, Franklin, Ind	1 50
Second, H. D. Brubaker, Ridgeway, Ind	1 00
Plate Stark, Joe A. Burton, Orleans, Ind	1 50
Second, J. J. Vance, Springport, Ind	1 00
Plate Pewaukee, E. A. Robison, Rocklane, Ind	1 50
Second, Gertrude Sargent, Lawrence, Ind	1 00
Plate Roxbury Russet, J. D. Whitesides, Franklin, Ind	1 50
Second, L. M. Gregg, Springboro, O	1 00
Plate English Russet, W. B. Flick, Lawrence, Ind	1 50
Second, J. D. Whitesides, Franklin, Ind	1 00
Plate Hyslop, Gertrude Sargent, Lawrence, Ind	1 50
Second, Mary J. Flick, Lawrence, Ind	1 00
Plate Red Siberian, John A. Heavenridge, Liberty, Ind	1 50
Plate Transcendent, C. P. Bradley, South Bend, Ind	1 50
Second, J. J. Vance, Springport, Ind	1 00
Plate Whitney, C. P. Bradley, South Bend, Ind	1 50

PEARS.

Eight varieties, no award	$8 00
Second, D. F. Corwin, Springboro, O	5 00
Six varieties, W. B. Flick, Lawrence, Ind	5 00
Second, J. J. Vance, Springport, Ind	3 00
Plate Bartlett, C. A. Saltmarsh, Seymour, Ind	1 50
Second, W. B. Flick, Lawrence, Ind	1 00
Plate Augon, J. J. Vance, Springport, Ind	1 50
Second, Roy Hindman, Lawrence, Ind	1 00
Plate Angouleme (Duchess), W. B. Flick, Lawrence, Ind	1 50
Second, Mary J. Flick, Lawrence, Ind	1 00
Plate Flemish Beauty, W. B. Flick, Lawrence, Ind	1 50
Second, Mary J. Flick, Lawrence, Ind	1 00
Plate Howell, L. M. Gregg, Springboro, O	1 50
Second, C. P. Bradley, South Bend, Ind	1 00
Plate Keiffer, C. A. Saltmarsh, Seymour, Ind	1 50
Second, J. W. Daubenspeck, Mattsville, Ind	1 00
Plate Louise Bow, D. F. Corwin, Springboro, O	1 50
Second, L. M. Gregg, Springboro, O	1 00
Plate Sheldon, John Marvel, Royalton, Ind	1 50
Second, Roy Hindman, Lawrence, Ind	1 00
Plate Seckel, J. W. Daubenspeck, Mattsville, Ind	1 50
Second, L. M. Gregg, Springboro, O	1 00
Plate Easter Beurre, no award	1 50
Second, no award	1 00
Plate Lawrence, L. M. Gregg, Springboro, O	1 50
Second, D. F. Corwin, Springboro, O	1 00
Plate Winter Nelis, no award	1 50
Second, L. M. Gregg, Springboro, O	1 00
Plate Vicker, L. M. Gregg, Springboro ,O	1 50
Second, D. F. Corwin, Springboro, O	1 00

PEACHES.

Six varieties, no award	$6 00
Second, no award	3 00
Three varieties, no award	3 00
Second, no award	1 50
Plate Clings, no award	1 50

QUINCES.

Collection Quinces, Mary J. Flick, Lawrence, Ind	3 00
Second, D. F. Corwin, Springboro, O	1 50
Orange Quince, Mary J. Flick, Lawrence, Ind	1 50
Meeches Prolific Quince, Mary J. Flick, Lawrence, Ind	1 50

Second, D. F. Corwin, Springboro, O	1 00
Champion Quince, D. F. Corwin, Springboro, O	1 50
Missouri Mammoth Quince, Wm. Mustard, Ripple, Ind	1 50
Second, Mary J. Flick, Lawrence, Ind	1 00

PLUMS.

Collection native, J. W. Daubenspeck, Mattsville, Ind	$2 00
Second, J. J. Vance, Springport, Ind	1 00
Plate native, J. W. Daubenspeck, Mattsville, Ind	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate European, J. J. Vance, Springport, Ind	1 50

GRAPES.

Ten varieties, C. A. Saltmarsh, Seymour, Ind	$5 00
Second, C. A. Saltmarsh, Seymour, Ind	2 50
Six varieties, C. P. Bradley, South Bend, Ind	3 00
Second, J. J. Vance, Springport, Ind	1 50
Five clusters, C. P. Bradley, South Bend, Ind	2 00
Second, C. A. Saltmarsh, Seymour, Ind	1 00
Plate Worden, C. P. Bradley, South Bend, Ind	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate Concord, C. P. Bradley, South Bend, Ind	1 50
Second, John F. Michael, Greenville, O	1 00
Plate Wilder, C. P. Bradley, South Bend, Ind	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate Duchess, Sylvester Johnson, Irvington, Ind	1 50
Second, no award	1 00
Plate Brighton, C. P. Bradley, South Bend, Ind	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate Salem, Sylvester Johnson, Irvington, Ind	1 50
Second, no award	1 00
Plate Lindley, no award	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate Pocklington, C. P. Bradley, South Bend, Ind	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate Niagara, C. P. Bradley, South Bend, Ind	1 50
Second, John F. Michaels, Greenville, O	1 00
Plate Moore's Diamond, C. P. Bradley, South Bend, Ind	1 50
Second, Sylvester Johnson, Irvington, Ind	1 00
Plate Vergennes, Sylvester Johnson, Irvington, Ind	1 50
Second, E. A. Robison, Rocklane, Ind	1 00
Plate Hothouse, Sylvester Johnson, Irvington, Ind	1 50
Plate Seedlings, H. G. McPike, Alton, Ill	1 50
Second, C. P. Bradley, South Bend, Ind	1 00

MISCELLANEOUS.

Plate Persimmons, E. A. Robison, Rocklane, Ind	1 00
Second, Mary J. Flick, Lawrence, Ind	50
Plate Paw-paws, E. A. Robison, Rocklane, Ind	1 00
Second, Mary J. Flick, Lawrence, Ind	50
Display fruits by County Society, E. A. Robison, Rocklane, Ind	50 00
Second, H. C. Weaver, Shelbyville, Ind	30 00
Third, I. N. Cotton, Ripple, Ind	20 00
Display fruits by girl, Fred Dickson, Lawrence, Ind	16 00
Second, Roy Hindman, Lawrence, Ind	12 00
Third, Hubert Kipp, Indianapolis	8 00

CLASS XXXIX—Flowers.

(Mrs. W. R. Goodwine, Judge.)

Two funeral designs, E. H. Schmidt, Indianapolis	$25 00
Three baskets, E. H. Schmidt, Indianapolis	10 00
Three bouquets, E. H. Schmidt, Indianapolis	10 00
Collection cut roses, W. W. Coles, Kokomo, Ind	10 00
Second, W. W. Coles, Kokomo, Ind	5 00
Collection cut flowers, W. W. Coles, Kokomo, Ind	10 00
Second, E. H. Schmidt, Indianapolis	5 00
Collection cannas, W. W. Coles, Kokomo, Ind	10 00
Second, W. W. Coles, Kokomo, Ind	5 00
Collection gladioli, W. W. Coles, Kokomo, Ind	10 00
Second, W. W. Coles, Kokomo, Ind	5 00
Original show design, E. H. Schmidt, Indianapolis	25 00
Bouquet by boy or girl, Carl Pfefferman, Indianapolis	10 00
Second. Jessie Tyer, Indianapolis	5 00

CLASS XL—Cut Flowers.

(Mrs. W. R. Goodwine, Jr., Judge.)

Collection begonias, E. A. Parker, Indianapolis	$5 00
Second, E. R. Henley, Westfield, Ind	3 00
Collection asters in bloom, Augusta Shelby, Indianapolis	4 00
Second, E. R. Henley, Westfield, Ind	2 00
Eight cannas, E. R. Henley, Westfield, Ind	4 00
Second, no award	2 00
Six tuberoses, Augusta Shelby, Indianapolis	4 00
Second, E. R. Henley, Westfield, Ind	2 00

Collection carnations, E. R. Henley, Westfield, Ind	4 00
Collection climbing and trailing plants, E. A. Parker, Indianapolis	4 00
Second, Augusta Shelby, Indianapolis	2 00
Three hanging baskets, E. A. Parker, Indianapolis	3 00
Second, W. B. Flick, Lawrence, Ind	2 00
Collection plants, E. A. Parker, Indianapolis	8 00
Second, E. R. Henley, Westfield, Ind	4 00
Collection geraniums, Mrs. P. D. Stagg, Greensburg, Ind	3 00
Second, Mrs. E. A. Parker, Indianapolis	2 00
Collection roses, Mrs. E. A. Parker, Indianapolis	4 00
Second, Mrs. P. D. Stagg, Greensburg, Ind	2 00
Collection verbenas, Ella Estabrook, Indianapolis	3 00
Second, Mrs. P. D. Stagg, Greensburg, Ind	2 00
Collection dahlias, Mrs. P. D. Stagg, Greensburg, Ind	3 00
Second, Julius Moesch, Indianapolis	2 00
Collection gladiolus, Julius Moesch, Indianapolis	3 00
Second, Mrs. P. D. Stagg, Greensburg, Ind	2 00
Design cut flowers, Mrs. E. T. Akass, Indianapolis	8 00
Second, Ella Estabrook, Indianapolis	4 00
Twelve carnations, Julius Moesch, Indianapolis	3 00
Second, Mrs. E. A. Parker, Indianapolis	2 00
Two bouquets, Ella Estabrook, Indianapolis	4 00
Second, Mrs. E. A. Parker, Indianapolis	2 00

CLASS XLI—Bees and Honey.

(Alonzo Tyner, Judge.)

Comb honey, W. Z. Hutchinson, Flint, Mich	$13 00
Second, Walter S. Pouder, Indianapolis	6 00
Extracted honey, Elmer Hutchinson, Vassar, Mich	13 00
Second, Walter S. Pouder, Indianapolis	6 00
Beeswax, W. Z. Hutchinson, Flint, Mich	7 00
Second, W. S. Pouder, Indianapolis	3 00
Italian bees, John F. Michael, Greenville, O	5 00
Second, W. Z. Hutchinson, Flint, Mich	3 00
Italian queen bee, Geo. H. Kirkpatrick, Union City, Ind	5 00
Second, W. Z. Hutchinson, Flint, Mich	3 00
Gallon honey vinegar, W. Z. Hutchinson, Flint, Mich	2 00
Second, Elmer Hutchinson, Vassar, Mich	1 00
Honey plants, W. Z. Hutchinson, Flint, Mich	10 00
Second, Elmer Hutchinson, Vassar, Mich	5 00
Apiarian supplies, W. S. Pouder, Indianapolis	15 00
Second, W. Z. Hutchinson, Flint, Mich	8 00
Comb foundation for brood chamber, W. S. Pouder, Indianapolis	2 00

Second, W. Z. Hutchinson, Flint, Mich	1 00
Comb foundation for surplus honey, John F. Michael, Greenville, O.	2 00
Second, W. S. Pouder, Indianapolis	1 00
Honey extractor, W. S. Pouder, Indianapolis	3 00
Second, W. Z. Hutchinson, Flint, Mich	2 00
Wax extractor, W. Z. Hutchinson, Flint, Mich	3 00
Second, W. S. Pouder, Indianapolis	2 00
Bee hive for comb honey, W. S. Pouder, Indianapolis	3 00
Second, John F. Michael, Greenville, O	2 00
Bee hive for extracted honey, W. S. Pouder, Indianapolis	3 00
Second, John F. Michael, Greenville, O	2 00
Shipping crate, W. S. Pouder, Indianapolis	2 00
Second, John F. Michael, Greenville, O	1 00
Uncapping knife, John F. Michael, Greenville, O	1 00
Second, W. S. Pouder, Indianapolis	50
Smoker, John F. Michael, Greenville, O	1 00
Second, W. Z. Hutchinson, Flint, Mich	50

Respectfully submitted,

MORTIMER LEVERING,
Superintendent.

MACHINERY.

To the Indiana Delegate State Board of Agriculture:

We had in this Department —— exhibitors. The great majority of them were assigned space the week prior to the Fair, but we had some trouble in placing those who came in a little late, as considerable of the space occupied by machinery exhibitors in former years had been otherwise appropriated without any provision being made for the deficiency. There were more exhibitors than usual and many of them used more space than ever before. In co-operation with the Superintendent of Privileges, all were finally located satisfactorily, but there was not a foot of ground unoccupied on the lots set apart for machinery. I would suggest that the grounds be replatted before another fair is held, so that there will be no lack of space. Some very desirable space may be had just north of Art Hall.

Owing to a combination among manufacturers, much of the heavy machinery, such as engines and threshers, was not brought out, but some few not in the combine were present, and were well pleased with the results of the Fair. In the line of farm implements and machinery the display was very complete and interesting. Most every manufacturer had something novel and attractive in his display, and these new inventions and features are what interest farmers, as the object of their annual visit to the Fair is to see and know what has been done to further their interests and lighten and expedite their labors.

The feature of having plats of corn and potatoes and teams furnished to test machinery on the grounds was very favorable commented upon and quite a number took advantage of same and were able to show their machinery in practical operation. Owing to the fact that the potatoes had not been kept clean, we could not get any one to operate their diggers, as it would have been an impossibility to have made them do satisfactory work. Corn harvesters, cultivators, plows, harrows and wheat drills were operated during three days of the Fair and attracted a good deal of attention.

I think it would be advisable to have these cultivated plats of corn and potatoes another season, but they need not be more than one-fourth as large as they were last year, and should be in the very best shape and condition to properly display machinery.

The small investment necessary to construct an office for the Superintendent of this Department was a wise one, making it much easier and convenient to attend to the wants of exhibitors.

The liberality of our Association in providing and assigning space to exhibitors in this Department free of charge or fee has won the good will of all, and quite a number said they were shown more favors upon the Indiana State Fair Grounds than anywhere else they exhibited. The good will of these people we should strive to maintain, as this is always one of the most interesting features of our Fair to a large class of visitors.

For the lack of a machinery hall, or covered space of some sort, quite a number of fine exhibits were not brought on the grounds, although they had been forwarded to the Fair. Just as soon as the Association has sufficient means provided, a machinery hall should be constructed.

Inasmuch as exhibitors in this Department get no premium money—depending upon the advertising they get as a remuneration for the time and money they expend in placing their exhibit, I would suggest that in the future we give them sufficient space in our annual report to publish their name, address and a full list of all articles exhibited.

Respectfully submitted,

W. W. STEVENS,
Superintendent.

Adjourned sine die.

W. W. STEVENS,
President.

CHAS. F. KENNEDY,
Secretary.

MEETING OF STATE BOARD.

Upon call of Vice-President W. W. Stevens, the Indiana State Board of Agriculture convened in Room 11, Capitol Building, all members being present except Messrs. Lagrange and Harris.

The claim of Mrs. A. E. Carter for coins lost at the State Fair was presented and, upon motion of Mr. Jones, was rejected by a unanimous vote.

Claims in favor of R. H. Mattern, Indianapolis Flower and Plant Company, and Banner Publishing Company were allowed.

Adjourned sine die.

INDIANA FAIRS—OFFICERS FOR 1897.

NAME OF SOCIETY.	PRESIDENT.	ADDRESS.	SECRETARY.	ADDRESS.
INDIANA STATE FAIR	CHAS. B. HARRIS	GOSHEN	CHAS. F. KENNEDY	INDIANAPOLIS.
Benton and Warren Agricultural Society	Henry Robertson	Boswell	W. H. McKnight	Boswell.
Boone County Agricultural Association	Wm. C. Burton	Lebanon	Chas. W. Scott	Lebanon.
Boonville Fair Association	Clamor Pilzer	Boonville	S. W. Faylor	Boonville.
Clinton County Agricultural Society	Jas. A. Hedgecock	Frankfort	Myron H. Belknap	Kilmore.
Dearborn County Agricultural Association	A. E. Nowlin	Lawrenceburg	H. L. Nowlin	Lawrenceburg.
Delaware County Agricultural Society	Wm. T. Wood	Muncie	M. S. Claypool	Muncie
Dubois County Agricultural Association	E. W. Pickhardt	Huntingburg	Daniel Reutepohler	Huntingburg.
Fountain County, Richland Tp., Agricultural Assn	C. R. McKinny	Newtown	Horace Gray	Newtown.
Fountain, Warren and Vermillion Agr'l Assn	C. W. Diffendorfer	Covington	W. F. Wood	Covington.
Fulton County Agricultural Association	Milton McCaughy	Fletchers	E. C. Mercer	Rochester.
Gibson County Agricultural Association	John W. Johnson	Princeton	S. Vet Strain	Princeton.
Grant County Agricultural Association	George Dicken	Marion	H. E. Hamaker	Marion.
Hamilton County Agricultural Association	John A. Kerchival	Sheridan	N. W. Cowgill	Sheridan.
Hancock County Agricultural Association	Chas. Downing	Greenfield	Elbert Tyner	Greenfield.
Harrison County Agricultural Association	Michael Gleitz	Corydon	Henry Wright	Corydon.
Henry County Agricultural Association	Robert Cooper	Cadiz	J. O. Mendenhall	New Castle.
Jay County Agricultural Association	John Schneck	Portland	James A. Graves	Portland.
Jennings County Agricultural Association	J. W. Myres	Elwood	Fred H. Nauer	North Vernon.
Johnson County Agricultural Association	S. W. Dungan	Franklin	W. S. Young	Franklin.
Kendallville Fair Association	N. B. Newman	Kendallville	A. S. Parker	Kendallville.
Knox County Agricultural Association	Isaac Lyons	Vincennes	John Burke	Vincennes.
Lake County Agricultural Society	Ernest H. Hixen	Crown Point	A. A. Bibler	Crown Point.
Laporte County Agricultural Association	Riley F. Small	Westville	J. Vene Dorland	Laporte.
Lawrence County Agricultural Association	T. O. Daggy	Bedford	S. T. Tollman	Bedford.

Madison County Agricultural Association	N. J. Leisure	Leisure	D. G. Evans	Elwood.
Marion County Agricultural Society	C. C. Richards	Howland	Ida F. Richardson	Indianapolis.
Middletown Fair Association	A. S. Miller	Middletown	F. A. Wisehart	Middletown.
Monroe County Agricultural Association	W. N. Showers	Bloomington	C. R. Worrall	Bloomington.
Montgomery County Agricultural Association	John L. Davis	Crawfordsville	W. W. Morgan	Crawfordsville.
New Carlisle Fair Association	I. N. Miller	New Carlisle	A. F. Compton	New Carlisle.
Newton County Agricultural Association	Patrick Keefe	Kentland	H. A. Strohn	Kentland.
Newton County Agricultural Association	C. M. Hanger	Morocco	G. W. Stower	Morocco.
Noble County Agricultural Association	O. Kimmell	Kimmell	J. H Hoffman	Ligonier.
Putnam County Agricultural Association	J. C. Bridges	Bainbridge	A. R. Allison	Bainbridge.
Randolph County Agricultural Association	Wm. Fitzmaurice	Winchester	D. E. Hoffman	Winchester.
Rush County Agricultural Association	W. O. Walton	Rushville	W. L. King	Rushville.
Shelby County Agricultural Association	Isom Ray	Shelbyville	C. E. Amsden	Shelbyville.
Steuben County Agricultural Association	Horace Van Auken	Angola	Orville Goodale	Angola.
St. Joseph County Agricultural Association	E. A. Metzger	South Bend	C. M. Krieghbaum	South Bend.
Switzerland County Agricultural Association	John F. House	Avon	Wm. H. Madison	East Enterprise.
Swayzee Fair Association	Geo. McMaurina	Point Isabel	E. C. King	Sweetser.
Tippecanoe County Agricultural Association	James Murdock	Lafayette	Wm. M. Blackstock	Lafayette.
Vanderburgh County Agricultural Association	W. M. Akin	Evansville	R. L. Akin	Evansville.
Vigo County Agricultural Association	W. T. Beauchamp	Terre Haute	W. H. Duncan	Terre Haute.
Warren Fair Association	S. C. Rousch	Warren	Grant M. Fleming	Warren.
Washington County Agricultural Association	H. C. Hobbs	Salem	E. W. Menaugh	Salem.
Wayne County Agricultural Association	John Bowman	Hagerstown	F. A. Balbridge	Hagerstown.

INDIANA FAIRS—NUMBER OF EXHIBITS, 1897.

SOCIETY.	Speed Horses.	Show Horses.	Mules.	Cattle.	Sheep.	Swine.	Poultry.	Dairy.	Bees and Honey.	Agricultural and Horticultural.	Fine Arts.	Miscellaneous.	Total.
Benton and Warren County Agr'l Asso'n	65	117	12	35	30	63	170	7	4	312	1,707	17	2.539
Boone County Agricultural Association	73	101	3	67	85	84	429	106	21	72	493	61	1,595
Boonville Fair Association (not reported)	....	....	....	....	....	....	....	....	....	....	....	....	....
Clinton County Agricultural Society	56	88	3	68	50	94	402	5	32	202	1,029	48	2,077
Dearborn County Agricultural Association	45	121	3	46	65	43	92	....	....	184	741	89	1,432
Delaware County Agricultural Association	55	186	26	93	95	132	289	....	....	581	644	48	2,119
Dubois County Agricultural Association	21	175	2	79	70	26	58	666	....	96	818	75	2,086
Fountain County Agricultural Association	....	147	19	31	42	71	92	7	....	474	307	....	1.190
Fountain, Warren and Vermillion Co. A. A.	55	128	25	38	30	60	230	....	....	175	1,670	17	2,428
Fulton County Agricultural Association	30	99	....	45	....	63	120	248	....	160	635	....	1,400
Gibson County Agricultural Association	75	238	20	38	65	80	60	15	6	538	1,500	35	2,670
Grant County Agricultural Society	120	25	10	40	20	25	220	....	....	120	250	....	830
Hamilton County Agricultural Association	59	151	....	52	21	30	176	....	....	531	626	2	1,848
Hancock County Agricultural Association	49	96	....	49	61	48	340	....	15	212	1.113	3	1,986
Harrison County Agricultural Society	34	492	30	131	83	203	91	....	....	723	1,320	24	3.134
Henry County Agr'l Society (not reported)	....	....	....	....	....	....	....	....	....	....	....	....	....
Jay County Agricultural Association	44	211	....	74	112	156	155	....	....	673	1,437	44	2,906
Jennings County Agricultural Association	50	40	5	20	40	40	100	....	....	50	1,500	....	1,845
Johnson County Agricultural Association	61	134	8	69	26	66	180	....	....	749	1,231	210	2,729
Kendallville Fair Association	21	63	....	37	69	53	252	10	1	340	680	661	2,187
Knox County Agricultural Association	67	135	35	87	92	86	160	77	....	162	592	70	1,533
Lake County Agricultural Association	47	79	....	66	27	45	33	10	....	36	550	15	908
Laporte County Agricultural Association	41	82	....	31	51	43	32	....	8	72	486	101	950
Lawrence County Agricultural Association	75	40	....	....	....	....	....	10	....	50	1,100	560	1,835
Madison County Agr'l Asso'n (not reported)	....	....	....	....	....	....	....	....	....	....	....	....	....

Marion County Agricultural Association	....	....	....	....	....	....	....	....	....	156	....	....	156
Middletown Fair Association	120	140	20	40	90	60	450	25	5	40	800	100	890
Montgomery County Fair Association	101	413	....	94	153	218	467	....	....	632	721	225	3,024
New Carlisle Fair Association	....	38	....	3	13	31	44	....	....	162	273	47	611
Newton County Agr'l Asso'n (Morocco)	....	30	....	....	....	....	25	....	....	50	300	....	405
Newton County Agr'l Asso'n (Kentland)	15	20	8	8	....	31	....	....	....	....	286	....	368
Putnam County Agricultural Association	44	80	3	8	85	59	391	....	....	103	599	....	1,372
Randolph County Agricultural Association	32	39	....	....	4	24	50	....	....	105	282	158	694
Rush County Agricultural Association	45	135	24	66	30	90	455	....	....	350	1,160	125	2,480
Shelby County Agricultural Association	....	231	29	117	69	98	923	....	....	931	889	168	3,455
Steuben County Agricultural Association	21	46	....	22	37	42	85	....	....	893	569	36	1,751
St. Joseph County Agricultural Association	67	45	....	32	50	29	41	....	6	119	352	416	1,157
Switzerland County Agricultural Asso'n	33	114	22	37	28	36	86	....	....	380	490	107	1,333
Swayzee Fair Association	46	133	14	24	31	69	141	....	....	110	867	2	1,437
Tippecanoe County Agricultural Asso'n	105	157	65	68	60	87	571	9	....	229	1,187	196	2,734
Vanderburgh County A. A. (not reported)	....	....	....	....	....	....	....	....	....	....	....	....	....
Vigo County Agricultural Association	20	40	....	25	20	40	200	25	1	200	1,200	....	1,871
Warren Fair Association	74	194	....	33	62	73	172	....	10	337	1,076	76	2,107
Washington County Agricultural Asso'n	16	70	17	25	17	29	28	....	....	215	555	88	1,062
Wayne County Agricultural Association	58	117	....	56	23	114	227	....	....	126	1,067	35	1,823

INDIANA FAIRS—PREMIUMS PAID IN 1897.

NAME OF SOCIETY.	Speed.	Show Horses.	Mules.	Cattle.	Sheep.	Swine.	Poultry.	Dairy.	Bees and Honey.	Agricultural and Horticultural.	Arts and Women's Work.	Miscellaneous.	Total.
Benton and Warren Counties Agricultural Association	$1.450 00	$288 00	$23 50	$171 00	$59 50	$140 40	$69 30	$3 00	$1 50	$62 25	$414 00	$21 70	$2,709 15
Boone County Agricultural Association	1,550 00	252 00	16 00	273 00	131 00	166 00	82 75	55 75	23 00	39 50	232 00	57 50	2,878 50
Boonville Fair Ass'n. (Not reported													
Clinton County Agricultural Association	1,450 00	224 00	3 60	366 00	87 00	134 50	105 00	1 50	20 00	118 50	224 00	32 00	2,760 10
Dearborn County Agricultural Ass'n	1,137 50	377 00	12 00	203 00	98 00	113 00	40 95			49 60	165 19	13 00	2,209 24
Delaware County Agricultural Ass'n	2,106 00	530 00	42 00	575 00	225 00	339 00	150 00			198 00	376 00	121 00	4,656 00
Dubois County Agricultural Ass'n	465 00	283 00	6 00	157 50	54 00	48 00	80 40	73 75		61 65	157 00	15 00	1,350 90
Fountain County Agricultural Ass'n		250 00	34 00	86 00	63 00	91 00	17 00	20 00		58 25	46 75		669 00
Fountain, Warren and Vermillion Counties Agricultural Association	1,000 00	280 00	40 00	135 00	60 00	100 00	85 00			75 00	400 00		2,175 00
Fulton County Agricultural Association	342 00	573 48											915 48
Gibson County Agricultural Ass'n	613 30	363 00	37 50	153 00	70 00	133 50	26 00	21 00	6 00	115 00	330 00	136 30	2,001 80
Grant County Agricultural Association	1,016 60	262 75		107 00	26 00	49 00	42 00			83 83	105 25	7 50	1,699 93
Hamilton County Agricultural Ass'n													680 00
Hancock County Agricultural Ass'n	1,060 00	439 50		273 00	123 00	203 00	172 45		24 00	131 60	448 35	26 00	2,993 90
Harrison County Agricultural Ass'n	660 00	597 00	68 00	327 00	88 00	270 00	49 00			214 00	245 50	39 50	2,558 00
Henry County Ag'l Ass'n. (Not reported)													
Jay County Agricultural Association	1,475 00	466 50		228 50	185 50	365 00	49 75			107 75	261 25	228 21	3,367 46
Jennings County Agricultural Association. (Not reported)													
Johnson County Agricultural Ass'n	977 75	288 80	30 00	214 60	65 90	146 90	84 40		26 25	177 40	228 53	47 41	2,287 94
Kendallville Fair Association	503 00	150 00		200 07	105 00	100 10	95 00	5 00	50	160 00	293 00		1,611 73
Knox County Agricultural Association	1,095 75	366 00	92 00	523 00	173 00	201 00	61 50	38 50		153 00	310 00	42 80	3,056 55
Lake County Agricultural Association													1,620 44
Laporte County Agricultural Ass'n	923 90	184 90		129 40	31 40	82 40	19 15		7 90	57 70	246 70	55 13	1,738 58
Lawrence County Agricultural Ass'n	2,000 00	100 00						15 00		27 00	325 75	212 50	2,680 25
Madison County Agricultural Ass'n													4,536 57

Marion County Agricultural Ass'n	......	......	......	......	......	......	......	......	......	58 95	......	......	58 95
Middletown Fair Association	1,500 00	450 00	40 00	160 00	150 00	100 00	125 00	10 00	2 00	50 00	300 00	50 00	2,937 00
Montgomery County Agricultural Ass'n	2,500 00	1,095 00	......	611 00	330 00	290 50	314 00	......	......	320 50	381 00	428 00	6,270 00
New Carlisle Fair Association	......	69 50	......	5 75	13 50	14 05	7 50	......	......	29 85	43 35	23 45	210 95
Newton County Agr'l Ass'n (Morocco)	612 00	150 00	......	......	......	......	15 00	......	......	40 00	200 00	......	1,017 00
Newton County Agr'l Ass'n (Kentland)	475 00	134 00	41 00	95 00	......	58 00	7 00	39 75	......	30 25	129 75	6 50	1,016 25
Putnam County Agricultural Ass'n	600 00	132 00	12 00	28 00	99 00	76 50	112 50	......	......	33 50	162 50	......	1,256 00
Randolph County Agricultural Ass'n	505 00	102 00	......	......	7 00	55 00	27 75	......	......	72 00	71 75	......	26 00
Rush County Agricultural Association	693 65	411 70	60 00	216 00	59 30	118 50	130 60	......	......	136 50	402 00	80 75	2,309 00
Shelby County Agricultural Association	820 00	793 50	83 00	505 00	181 50	283 00	321 65	......	......	121 50	316 50	62 60	3,488 25
Steuben County Agricultural Ass'n	689 56	94 00	......	58 00	44 00	46 00	22 00	......	......	91 00	83 00	27 50	1,155 00
St. Joseph County Agricultural Ass'n	1,340 00	102 00	......	58 00	56 00	67 00	2 00	......	7 00	71 50	67 22	500 00	2,289 97
Switzerland County Agricultural Ass'n	520 00	335 50	57 00	142 00	54 00	66 50	32 50	......	......	163 50	197 50	38 75	1,607 25
Swayzee Fair Association	501 00	341 50	35 50	161 00	57 00	126 00	93 50	......	......	65 50	201 75	16 00	1,592 75
Tippecanoe County Agricultural Ass'n	......	......	......	......	......	......	......	......	......	......	......	......	5,675 00
Vanderburgh County Agricultural Ass'n	......	......	......	......	......	......	......	......	......	......	......	......	7,016 50
Vigo County Agricultural Association	......	......	......	......	......	......	......	......	......	......	......	......	1,125 00
Warren Fair Association	698 50	536 00	......	233 50	126 00	155 58	91 75	......	5 50	152 50	332 75	84 50	2,416 50
Washington County Agricultural Ass'n	410 00	168 00	33 50	38 50	24 50	37 50	9 00	......	......	50 00	125 00	95 00	989 00
Wayne County Agricultural Association	1,025 00	300 60	......	223 65	32 60	168 75	82 75	......	......	72 90	199 22	27 90	2,138 37

CEREAL AND ROOT CROP STATISTICS FOR 1897.

COMPILED BY J. B. CONNER, CHIEF OF STATE BUREAU OF STATISTICS FOR INDIANA.

WHEAT.

The yield of Indiana compared for ten years:

YEAR.	Bushels.	Acres.	Average Bushels per Acre.
1897	37,769,875	2,479,875	15.23
1896	24,574,853	2,852,230	8.5
1895	22,674,101	2,728,210	8.03
1894	50,792,620	2,540,424	19.56
1893	38,114,708	2,550,014	14.87
1892	42,126,144	2,654,645	15.86
1891	58,305,796	2,891,922	20.09
1890	28,352,346	2,821,129	10.5
1889	41,541,570	2,773,883	14.9
1888	28,750,764	2,726,111	10.5

The greatest producing counties for 1897:

COUNTY.	Bushels.	Bushels per Acre.
Rush	1,043,157	19
Shelby	973,312	16
Gibson	929,640	15
Elkhart	868,870	19
Posey	859,430	13

Greatest average yield per acre:

COUNTY.	Acres Sown.	Bushels per Acre.
Jefferson	14,934	20

CORN.

The yield in Indiana compared for ten years:

YEAR.	Bushels.	Acres.	Average Bushels per Acre.
1897	125,499,401	4,101,665	30.06
1896	148,578,898	4,005,690	37.09
1895	132,105,983	3,706,146	35.37
1894	95,205,132	3,526,116	27
1893	84,045,722	3,488,822	24.09
1892	111,217,463	3,563,337	31.2
1891	125,092,649	3,637,927	34.33
1890	87,092,513	3,446.459	25.2
1889	106,542,161	3,418,051	31
1888	128,436,284	3,419,377	37.5

The greatest producing counties for 1897:

COUNTY.	Bushels.	Yield per Acre.
Benton	3,719,981	37
Tippecanoe	3,332,109	33
Montgomery	3,129,948	37.9
Parke	2,690,616	54.1
Gibson	2,587,630	48.9

Greatest average yield per acre:

COUNTY.	Acres.	Bushels per Acre.
Parke	49,724	54.1

OATS.

The yield in Indiana compared for ten years:

YEAR.	Bushels.	Acres.	Average Bushels per Acre.
1897	35,574,823	1,208,697	29.4
1896	23,689,234	1,180,057	20.07
1895	24,601,831	1,098,700	22.5
1894	38,236,019	1,202,422	31.8
1893	32,015,229	1,206,301	26.54
1892	27,369,719	1,103,958	24.72
1891	23.123,189	897,952	25.75
1890	15,556,207	1,119,398	13.2
1889	28,710,935	950,231	30.2
1888	27,493,851	937,143	29.3

The greatest producing counties for 1897:

COUNTY.	Bushels.	Yield per Acre.
Benton	3,012,120	40
Newton	1,452,815	35
Jasper	1,372,070	34.3
Tippecanoe	1,307,616	36.9
White	1,178,825	25

Greatest average yield per acre:

COUNTY.	Acres.	Bushels per Acre.
Benton	75,303	40

BARLEY.

The yield in Indiana compared for ten years:

YEAR.	Bushels.	Acres.	Average Bushels per Acre.
1897	127,899	7,066	18.1
1896	296,914	16,045	18.5
1895	659,058	32,222	19.8
1894	255,134	10,738	23.76
1893	214,544	10,621	20.2
1892	231,842	10,810	21.44
1891	467,773	21,388	21.87
1890	387,802	22,745	17
1889	416,325	19,825	21
1888	403,515	18,913	21.3

The greatest producing counties for 1897:

COUNTY.	Bushels.	Yield per Acre.
Hancock	12,122	22
Henry	10,511	23
Franklin	9,154	23
Dearborn	9,144	21.9
Jefferson	7,263	26.9

Greatest average yield per acre:

COUNTY.	Acres.	Bushels per Acre.
Jefferson	269	26.9

RYE.

The yield in Indiana compared for ten years:

YEAR.	Bushels.	Acres.	Average Bushels per Acre.
1897	1,921,938	135,680	12.9
1896	4,082,800	369,409	11.05
1895	1,972,190	148,899	13.2
1894	1,147,037	59,835	19.17
1893	875,949	59,751	14.66
1892	927,843	62,976	14.73
1891	808,148	44,845	18.2
1890	784,191	58,785	13.3
1889	871,216	54,451	16
1888	545,425	35,497	15.3

The greatest producing counties for 1897:

COUNTY.	Bushels.	Bushels per Acre.
Elkhart	99,034	13
Marion	74,130	38
Steuben	71,820	37.7
Madison	68,835	13
Adams	62,266	15

Greatest average yield per acre:

COUNTY.	Acres.	Bushels per Acre.
Marion	1,951	38+

CLOVER HAY.

The yield in Indiana compared for ten years:

YEAR.	Tons.	Acres.	Average Tons per Acre.
1897	Not given.	1,007,831	Not given.
1896	1,006,901	713,555	1.41
1895	1,185,267	1,098,642	1.08
1894	1,672,553	1,087,373	1.54
1893	1,793,768	1,087,132	1.65
1892	1,910,852	1,174,341	1.62
1891	2,109,814	1,208,672	1.75
1890	2,057,188	1,196,040	1.7
1889	2,349,528	1,174,764	2
1888	1,311,450	1,061,846	1.2

TIMOTHY HAY.

The yield in Indiana compared for ten years:

YEAR.	Tons.	Acres.	Average Tons per Acre.
1897	Not given.	1,150,586	Not given.
1896	1,650,252	1,243,969	1.32
1895	1,003,788	1,451,272	.62
1894	1,644,509	1,133,226	1.46
1893	1,580,269	1,128,764	1.4
1892	1,814,835	1,209,890	1.5
1891	2,034,242	1,257,758	1.6
1890	2,112,457	1,242,622	1.7
1889	1,823,047	1,215,365	1.5
1888	1,548,888	1,237,417	1.2

WHEAT, CORN, OATS, RYE AND BARLEY.

Acreage, Average Yield per Acre and Production of Wheat in 1897, and Acreage of Corn, Oats, Rye and Barley Crops in 1897 by Counties.

COUNTIES.	Wheat.			Corn.	Oats.	Rye.	Barley.
	Area.	Average Yield per Acre.	Production.				
	Acres.	Bushels.	Bushels.	Acres.	Acres.	Acres.	Acres.
Adams	21,917	14	306,838	33,439	16,990	482	125
Allen	37,518	14	525,252	50,519	31,593	836	226
Bartholomew	47,727	12	572,724	50,384	7,308	992	122
Benton	182	10	1,820	100,540	75,303	65	23
Blackford	13,524	11	148,764	18,509	4,466	3,187	30
Boone	29,863	16	477,808	77,576	10,053	2,549	14
Brown	7,742	12	92,904	18,434	5,213	278	93
Carroll	40,199	19	763,781	56,984	12,288	1,106	71
Cass	39,870	19	757,530	53,066	13,272	2,998	136
Clark	18,763	14	262,682	29,719	5,389	338	92
Clay	17,186	12	206,232	36,491	11,777	135	....
Clinton	38,131	16	610,096	70,461	15,012	2,583	4
Crawford	7,873	10	78,730	19,366	7,176	20	....
Daviess	35,967	12	431,604	52,656	12,801	596	2
Dearborn	20,196	12	242,352	19,933	7,890	1,287	381
Decatur	33,508	11	368,588	43,129	6,621	390	42
Dekalb	25,573	15	383,595	26,915	18,462	1,032	238
Delaware	25,821	15	387,315	55,298	8,305	3,688	82
Dubois	33,756	15	506,340	27,935	10,453	110	134
Elkhart	45,730	19	868,870	38,797	16,443	7,618	94
Fayette	20,314	18	365,652	24,351	4,083	410	46
Floyd	5,142	14	71,988	11,769	3,307	308	28
Fountain	27,298	12	327,576	57,549	20,408	1,258	36
Franklin	26,221	16	419,536	32,094	9,648	1,531	396
Fulton	39,574	17	672,758	43,527	10,260	1,528	20
Gibson	61,976	15	929,640	52,921	5,737	730	55
Grant	25,918	15	388,770	58,065	9,855	2,492	62
Greene	18,686	16	298,976	54,136	12,241	453	33
Hamilton	38,054	20	761,080	64,247	10,598	2,760	112
Hancock	28,703	19	545,357	48,565	10,084	2,158	551
Harrison	34,499	16	551,984	36,258	12,525	656	121
Hendricks	29,557	15	443,355	53,430	7,969	894	16
Henry	38,929	19	739,651	57,618	9,857	3,670	457
Howard	29,006	18	522,108	50,497	6,212	1,277	15
Huntington	26,065	19	495,235	43,846	20,586	947	13
Jackson	30,425	11	334,675	42,975	15,156	892	4
Jasper	2,707	10	27,070	72,262	40,355	2,836	....
Jay	19,267	11	211,937	45,266	13,943	1,740	79
Jefferson	14,934	20	298,680	29,568	5,183	869	269
Jennings	15,332	12	183,984	27,938	5,390	316	3

COUNTIES.	Wheat.			Corn.	Oats.	Rye.	Barley.
	Area.	Average Yield per Acre.	Production.				
	Acres.	Bushels.	Bushels.	Acres.	Acres.	Acres.	Acres.
Johnson	39,482	18	716,676	50,369	3,375	612	46
Knox	51,288	16	820,608	64,892	5,220	461	15
Kosciusko	47,825	15	717,375	51,848	20,276	2,915	143
Lagrange	41,822	14	585,508	33,277	8,259	4,370	106
Lake	809	12	9,708	37,345	21,093	1,336	129
Laporte	44,593	13	579,709	52,498	18,947	3,834	87
Lawrence	10,586	11	116,446	28,177	13,274	313	…………
Madison	30,516	16	488,256	66,786	10,077	5,295	63
Marion	27,875	17	473,875	45,428	11,875	1,177	126
Marshall	40,893	15	613,395	44,614	16,296	4,131	34
Martin	10,648	13	138,424	26,785	9,186	169	…………
Miami	34,240	16	547,840	48,588	10,846	1,925	213
Monroe	10,789	15	161,835	21,107	8,018	319	…………
Montgomery	38,039	15	570,585	82,366	18,152	2,198	26
Morgan	21,469	14	301,566	43,948	5,417	553	14
Newton	7,458	10	74,580	70,228	41,509	1,726	80
Noble	41,491	13	539,383	33,925	14,506	1,563	66
Ohio	6,634	10	66,340	7,001	965	944	51
Orange	11,253	18	202,554	27,922	14,028	159	31
Owen	11,130	10	111,300	23,095	7,705	565	…………
Parke	24,753	16	396,048	49,724	13,356	1,155	17
Perry	16,696	11	183,656	25,005	7,103	211	80
Pike	30,659	13	398,567	36,398	6,706	433	10
Porter	8,284	9	74,556	37,151	26,192	2,577	…………
Posey	66,110	13	859,430	48,354	2,583	41	10
Pulaski	16,064	16	257,024	49,201	23,349	2,794	5
Putnam	19,207	13	249,691	47,331	9,117	900	…………
Randolph	32,837	16	525,392	69,315	16,458	3,010	192
Ripley	22,635	11	248,985	35,158	9,863	1,834	12
Rush	54,903	19	1,013,157	68,532	8,578	1,342	33
Scott	8,817	12	105,804	16,382	2,577	54	…………
Shelby	60,832	16	973,312	67,836	8,073	665	147
Spencer	41,731	18	751,158	38,419	7,145	249	162
Starke	5,411	12	64,932	20,090	4,100	2,530	9
Steuben	25,456	13	330,928	26,785	7,772	1,906	102
St. Joseph	48,767	14	682,738	37,890	14,415	5,130	61
Sullivan	29,808	16	476,928	55,136	11,077	577	…………
Switzerland	10,653	14	149,142	16,261	3,095	3,223	59
Tippecanoe	33,118	16	529,888	100,973	35,368	947	56
Tipton	20,333	17	345,661	52,316	4,020	2,829	32
Union	17,942	19	340,898	22,338	3,062	1,027	…………
Vanderburgh	29,336	20	586,720	25,050	1,795	218	3
Vermillion	17,049	13	221,637	40,685	10,335	732	29
Vigo	24,476	13	318,188	57,611	11,786	1,044	5
Wabash	29,378	15	440,670	39,368	16,245	1,286	28
Warren	11,903	13	154,739	64,683	36,758	184	3
Warrick	43,927	18	790,686	38,691	5,645	752	19
Washington	19,804	13	257,452	42,124	19,178	214	65
Wayne	35,606	19	676,514	52,732	11,149	2,433	218
Wells	21,904	14	306,656	44,632	14,517	1,077	191
White	26,007	10	260,070	100,393	47,153	1,774	42
Whitley	22,178	16	354,848	28,134	17,761	423	14
Total, 1897	2,479,077	15.23	37,769,875	4,101,665	1,208,697	135,680	7,066
Total, 1896	2,862,236	8.58	24,574,853	4,005,690	1,180,057	369,409	16,045

CORN, OATS, BARLEY, RYE, POTATOES, ETC.

Bushels Produced in 1897.

COUNTIES.	Bushels of Corn in 1897.	Bushels of Oats in 1897.	Bushels of Barley in 1897.	Bushels of Rye in 1897.	Bushels Irish Potatoes in 1897.	Tons of Timothy Hay in 1897.	Tons Clover Hay in 1897.	Pounds of Tobacco in 1897.
Adams	1,120,206	509,700	3,125	62,266	52,045	25,485	29,647	....
Allen	1,818,684	979,383	4,520	10,868	108,812	51,076	34,024	....
Bartholomew	1,662,672	175,392	3,660	13,888	50,468	18,103	27,177	....
Benton	3,719,980	3,012,120	....	585	57,794	18,962	4,044	....
Blackford	421,107	80,388	....	47,805	5,430	13,135	1,623	....
Boone	2,404,856	311,643	280	28,034	46,020	31,509	33,136	....
Brown	921,700	156,390	1,176	2,224	28,112	9,508	5,518	16,000
Carroll	1,937,456	405,504	....	14,376	59,400	14,956	28,081	....
Cass	1,432,782	358,344	....	32,978	87,894	14,716	21,676	....
Clark	802,413	128,236	1,564	3,718	47,601	11,831	10,621	24,157
Clay	875,784	259,094	....	2,160	14,070	27,826	16,085	....
Clinton	2,395 674	480,384	....	43,911	12,818	17,767	28,681	1,200
Crawford	329,222	107,710	....	200	10,794	6,683	6,651	600
Daviess	1,316,400	384,030	....	10,728	27,186	16,408	16,981	6,000
Dearborn	597,990	197,250	9,144	30,888	50,805	21,401	66,646	29,400
Decatur	1,854,547	211,872	504	5,460	47,128	18,705	7,975	....
Dekalb	834,365	627,706	5,712	15,480	3,761	29,572	24,091	....
Delaware	2,046,026	232,540	....	55,320	54,398	26,809	15,435	....
Dubois	419,025	209,060	1,680	1,210	21,930	13,716	12,051	14,928
Elkhart	1,202,707	526,176	1,410	99,034	112,203	17,863	8,228	....
Fayette	900,987	134,739	....	9,020	15,228	8,901	19,330	....
Floyd	247,149	69,447	560	4,004	34,040	4,308	3,691	110
Fountain	1,841,568	714,2[illegible]0	....	20,128	22,965	57,456	10,494	....
Franklin	994,914	202,606	9,154	22,965	39,304	14,690	17,721	....
Fulton	1,262,293	287,280	....	15,280	33,325	9,706	11,196	....
Gibson	2,587,630	180,321	....	13,140	33,960	10,833	30,476	....
Grant	1,625,820	315,360	1,550	42,364	51,000	28,653	18,777	....
Greene	1,245,128	232,579	....	4,077	15,765	24,537	13,819	18,600
Hamilton	1,863,163	338,848	2,240	46,920	37,924	22,513	18,910	....
Hancock	1,651,210	302,520	12,122	28,054	32,100	12,478	5,481	....
Harrison	580,128	263,025	2,057	7,216	31,186	10,921	17,117	17,100
Hendricks	1,923,480	262,977	480	16,092	25,576	24,231	12,001	....
Henry	1,901,394	295,710	10,511	36,700	80,904	18,964	27,126	....
Howard	1,615,904	211,208	180	15,324	52,380	14,223	14,237	....
Huntington	1,303,072	679,338	156	12,311	30,942	27,702	28,668	....
Jackson	1,160,325	373,744	....	44	39,591	22,050	14,391	....
Jasper	2,167,860	1,372,070	....	23,360	67,425	29,659	11,985	....
Jay	1,357,980	362,518	711	22,620	19,668	27,925	18,885	....
Jefferson	710,362	119,209	7,263	9,559	19,521	18,637	13,100	....
Jennings	866,078	113,190	2,528	34,595	16,956	10,605	148,506	....

COUNTIES.	Bushels of Corn in 1897.	Bushels of Oats in 1897.	Bushels of Barley in 1897.	Bushels of Rye in 1897.	Bushels Irish Potatoes in 1897.	Tons of Timothy Hay in 1897.	Tons Clover Hay in 1897.	Pounds of Tobacco in 1897.
Johnson	2,115,498	118,125	....	9,792	12,972	13,831	119,908	....
Knox	1,752,084	99,180	....	5,993	30,243	14,205	28,081	....
Kosciusko	1,503,592	628,556	3,146	37,895	112,840	20,902	19,953	....
Lagrange	965,033	239,511	2,014	56,810	60,844	14,986	19,042	....
Lake	987,315	843,255	1,835	21,376	546,921	37,616	1,896	....
Laporte	1,469,944	492,622	....	46,008	67,480	15,237	6,367	....
Lawrence	591,717	172,562	3,130	7,437	12,568	13,242	9,248	....
Madison	2,203,938	342,518	....	68,835	18,480	18,879	21,976	....
Marion	1,724,264	344,375	....	74,130	91,954	30,564	16,935	....
Marshall	1,249,192	471,584	918	57,834	55,950	9,160	10,939	....
Martin	616,055	165,348	....	1,690	27,964	11,182	18,901	8,250
Miami	1,554,816	347.072	....	28,775	43,560	18,067	28,521	....
Monroe	422.140	185,104	20	4,147	23,236	14,587	7,908	400
Montgomery	3,129,948	707,928	520	32,970	36,892	19,342	29,677	....
Morgan	1,625,891	167,927	....	6,803	15,680	18,328	13,127	....
Newton	2,247,296	1,452,815	....	18,986	47,982	17,343	1,942	....
Noble	1,051,675	449,686	....	17,198	76,956	16,750	31,738	....
Ohio	217,031	16,405	1,020	17,986	9,367	7,030	2,188	219,800
Orange	753,894	350,700	....	310	8,034	13,860	8,728	8,500
Owen	646,660	161,805	....	5,085	9,450	17,218	10,849	....
Parke	2,690,616	373,968	....	16,170	22,480	19,036	25,104	....
Perry	550,110	177,565	1,120	3,165	13,250	11,560	11,816	....
Pike	982,746	174,356	170	4,320	14 931	10,796	17,262	1,200
Porter	928,775	838,144	....	33,501	63,320	21,850	8,670	....
Posey	1,547,328	57,826	230	820	43,296	12,078	30,408	....
Pulaski	984,020	653,672	50	27,940	31,050	9,867	2,896	....
Putnam	1,419,930	246,159	....	8,100	19,875	22,926	282,436	....
Randolph	2,148,765	427,908	5,952	42.140	40,420	31,395	229.412	3,300
Ripley	1,160,214	40,348	204	23,842	50,930	20,119	24,136	....
Rush	2,674,698	274,496	....	61,732	38,565	16,371	34,122	....
Scott	360,404	46,509	....	....	2,700	3,656	7,500	....
Shelby	2,088,968	209,898	3,675	10.640	24,024	14,356	21,231	5,600
Spencer	960,475	199,060	4,050	4,980	108,876	16,446	16,332	690,680
Starke	441,980	98,400	108	25,300	41.503	2,106	939	....
Steuben	1,021,410	360,175	1,201	71,820	59,636	17,625	6,620	....
St. Joseph	830,335	233,160	1,836	30.496	94,765	20,271	23,671	....
Sullivan	992,448	243,694	....	5 193	12,137	17,428	26,313	....
Switzerland	390,264	46,425	1,062	41,899	45,120	9,744	4,625	1,391,750
Tippecanoe	3,332,109	1,307,616	....	13,258	69,706	18,741	21,154	....
Tipton	1,517,164	132,660	....	28,290	15,650	10,227	13,938	....
Union	737,154	91,860	35	26,702	650	2,365	10,855	....
Vanderburgh	876,759	25,645	....	5,450	31,279	12,267	19.840	500
Vermillion	1,220,550	237,705	....	12,444	6,246	5,367	8,859	....
Vigo	1,152,220	271,078	....	11,486	30,160	12,707	4,731	....
Wabash	1,299.144	536,085	560	18,004	42,720	19,060	23,582	....
Warren	2,199,222	1,176,256	....	45	32,836	13,843	23,836	200
Warrick	735,129	112,900	95	7,520	16,420	12,669	17,410	324,800
Washington	1,095,224	498,628	845	1,952	13,107	33,138	14,341	6,500
Wayne	1,687,424	312,172	4,360	11,611	36,892	17,520	28,770	8,000
Wells	1,428,224	464,544	6,112	20,463	43,888	26,604	23,595	....
White	2,509,826	1,178,825	1,050	19,514	11,235	30,498	8,853	....
Whitley	787,752	586,113	294	4,230	42,400	28,537	22,882	....
Total	125,499,401	35,574,823	127,899	1,921,938	4,027,229	1,668,527	1,907,174	2,797,575
Last year	148,578,898	23,689,234	296,914	4,082,800	7,107,809	1,650,252	1,006,901	5,117,540

POTATOES, HAY AND TOBACCO.

Acreage of Potatoes, Timothy Meadow, Clover Meadow, Tobacco and Seed Saved for 1897.

COUNTIES.	Potatoes.	Hay.		Seed Saved in 1896.		Tobacco.
		Timothy meadow.	Clover meadow.	Timothy.	Clover.	
	Acres.	Acres.	Acres.	Bush.	Bush.	Acres.
Adams	1,487	16,990	19,765	1,411	162	1
Allen	2.473	34,051	22,695	926	1,147	....
Bartholomew	768	14,483	18,118	476	10,879	10
Benton	781	15,170	2,696	2,025	309	....
Blackford	543	8,757	1,082	70	130	....
Boone	590	17,505	20,710	897	3,004	....
Brown	502	9,508	3,679	583	654	16
Carroll	1,360	9,971	18,721	272	4,929	....
Cass	1,348	9,811	14,451	147	1,641	3
Clark	747	9,465	7,081	27	764	29
Clay	402	18,551	8,929	204	952	4
Clinton	493	11,845	19,121	488	3,244	....
Crawford	257	6,683	4,434	489	1,154	....
Daviess	394	10,939	10,924	326	2,816	19
Dearborn	1,129	17.121	5,317	117	291	42
Decatur	548	12,470	15,514	800	4,986	....
Dekalb	1,509	19.715	16,061	211	1,926	....
Delaware	922	17,873	10,290	500	308	....
Dubois	510	9,144	14,701	115	3,542	16
Elkhart	2,877	11,909	7,053	153	175	....
Fayette	324	5,934	9,656	140	792	17
Floyd	920	3,447	2,461	12	786	....
Fountain	578	11,018	11,814	445	2,598	....
Franklin	1,026	8,745	15,162	268	1,431	6
Fulton	775	6,471	7,432	31	898	94
Gibson	306	7,222	15,238	309	3,815	2
Grant	680	19,102	12.518	1,404	323	....
Greene	1,205	18,403	9,213	944	989	31
Hamilton	998	15,009	12,607	668	2,048	....
Hancock	428	8,312	10,887	229	3,264	....
Harrison	1,006	7,281	9,782	216	3,353	19
Hendricks	550	16,154	14,001	545	5,419	....
Henry	908	9,482	13,863	160	1,366	....
Howard	873	9,477	11,418	128	1,658	2
Huntington	1,146	18,468	19,112	791	460	....
Jackson	747	14,700	9,594	181	2,388	....
Jasper	899	19,773	1,290	2,089	61	....
Jay	596	20,944	16,507	986	259	14
Jefferson	723	8,350	9,825	57	1,184	589
Jennings	407	16,956	10,605	189	3,151	6

COUNTIES.	Potatoes.	Hay.		Seed Saved in 1896.		Tobacco.
		Timothy meadow.	Clover meadow.	Timothy	Clover.	
	Acres.	Acres.	Acres.	Bush.	Bush.	Acres.
Johnson	282	9,221	18,272	158	14,660	1
Knox	593	9,470	18,721	295	5,137	8
Kosciusko	2,821	13,935	13,302	146	1,149	10
Lagrange	1,484	9,991	12,695	14	1,587	....
Lake	8,163	31,347	1,264	1,491	445	....
Laporte	1,687	10,182	4,245	261	1,437	....
Lawrence	126	10,055	7,413	163	1,900	1
Madison	616	12,596	14,651	606	968	1
Marion	1,999	20,376	11,290	123	2,959	2
Marshall	1,865	6,107	7,333	34	340	....
Martin	424	8,946	5,934	315	1,009	15
Miami	1,089	12,045	19,014	134	1,217	....
Monroe	314	14,587	5,272	550	360	....
Montgomery	802	18,415	19,785	595	5,288	3
Morgan	320	12,219	7,889	1,220	4,711	2
Newton	727	11,562	1,457	385	611	....
Noble	1,452	11,167	21,159	72	3,484	....
Ohio	493	4,687	1,459	12	....	314
Orange	103	9,240	5,819	172	1,357	17
Owen	225	17,218	7,233	861	967	5
Parke	281	12,691	12,552	72	3,481	....
Perry	530	5,780	5,658	63	2,298	52
Pike	237	8,097	11,508	32	2,773	2
Porter	1,584	21,850	5,780	170	652	....
Posey	528	6,039	15,204	6	7,966	11
Pulaski	675	6,578	1,931	381	239	....
Putnam	265	15,284	12,838	471	3,990	1
Randolph	860	20,930	19,608	638	724	30
Ripley	926	20,119	8,817	393	1,553	....
Rush	857	10,914	16,091	255	1,923	25
Scott	108	3,656	5,000	115	694	....
Shelby	364	9,571	14,154	88	10,649	8
Spencer	3,299	10,961	10,888	30	6,974	1,114
Starke	847	1,404	626	106	33	....
Steuben	1,723	13,514	15,781	178	2,030	....
St. Joseph	2,581	11,750	5,296	47	630	....
Sullivan	229	11,619	17,542	269	3,162	9
Switzerland	1,128	9,744	4,625	117	67	1,853
Tippecanoe	1,837	14,993	14,103	616	1,617	4
Tipton	313	6,818	6,969	250	1,620	....
Union	158	2,365	10,855	101	288	....
Vanderburgh	1,009	7,361	9,920	172	1,228	....
Vermillion	347	5,367	5,906	169	854	....
Vigo	520	12,707	9,462	249	1,170	....
Wabash	890	16,892	18,866	843	877	....
Warren	404	9,229	11,918	627	518	....
Warrick	4,590	8,446	11,607	1,507	5,600	406
Washington	257	16,569	9,561	2,418	2,884	13
Wayne	683	11,680	14,385	97	288	10
Wells	3,116	17,736	15,730	1,391	336	....
White	449	20,332	5,902	2,617	573	5
Whitley	848	19,025	15,255	75	1,598	....
Total	92,742	1,150,586	1,007,831	42,199	198,741	4,833
Total, 1896	102,425	1,243,969	713,555	29,480	371,188	6,975

SHEEP AND WOOL.

Number of Sheep and Pounds of Wool, by Counties, July 1, 1897.

COUNTIES.	Sheep.	Lambs.	Sheep Loss.		Wool Clip, 1897.
			Killed by Dogs.	Died of Disease.	
					Pounds.
Adams	9,964	8,089	136	668	54,943
Allen	17,025	11,737	385	1,436	86.237
Bartholomew	3,891	2,635	166	502	23,096
Benton	2,206	1,060	64	161	11,339
Blackford	8,873	3,709	305	451	37,611
Boone	8,143	5,146	102	700	46,689
Brown	5,166	3,550	132	732	24,196
Carroll	6,863	4,643	148	655	41,197
Cass	12,473	7,452	308	1,529	71,825
Clark	3,084	2,375	98	197	14,634
Clay	3,842	2,322	217	473	17,200
Clinton	5,672	8,451	79	509	31,719
Crawford	3,260	2,258	81	294	18,977
Daviess	5,433	3,452	379	784	27,784
Dearborn	2,170	2,002	122	155	11,552
Decatur	4,380	3,181	205	491	22,921
Dekalb	16,183	10,689	422	1,196	79,674
Delaware	11,566	7,376	378	1,079	68.531
Dubois	3,225	2,422	199	304	14,069
Elkhart	13,945	9,055	301	1,326	76,102
Fayette	3,950	2,676	775	276	20,166
Floyd	493	340	101	37	1.984
Fountain	11,442	7,101	255	2,285	64,692
Franklin	4,866	4,164	832	436	25.674
Fulton	12,362	8,166	176	1,417	66,053
Gibson	3,705	2,335	202	473	23,810
Grant	13,322	7,582	259	1,198	55,384
Greene	14,035	6,344	266	1,418	60,344
Hamilton	5,929	3,373	131	753	33,295
Hancock	4,799	2,940	126	626	26,408
Harrison	3,631	2,213	107	400	15,707
Hendricks	9,557	6,887	203	2,062	45,868
Henry	6,517	4,247	202	613	40,317
Howard	3,677	2,602	83	259	23,348
Huntington	9,521	7,240	226	835	58,249
Jackson	4,916	2,797	144	381	20,032
Jasper	1,948	1,342	36	548	11,121
Jay	11,894	9,719	124	710	71,203
Jefferson	4,348	3,773	322	458	24.798
Jennings	4,693	3,401	165	568	23,800

COUNTIES.	Sheep.	Lambs.	Sheep Loss.		Wool Clip, 1897.
			Killed by Dogs.	Died of Disease.	
					Pounds.
Johnson	5,981	3,083	111	777	35,160
Knox	4,296	2,871	348	343	22,547
Kosciusko	22,386	15,687	162	2,776	122,248
Lagrange	25,435	14,064	187	4,221	151,708
Lake	1,801	828	12	154	12,343
Laporte	8,742	3,445	294	917	48,765
Lawrence	6,710	4,179	503	568	29,421
Madison	5,221	3,831	217	373	29,712
Marion	3,038	2,038	123	526	17,950
Marshall	15,444	9,984	171	1,383	85,302
Martin	9,228	5,636	299	1,225	42,263
Miami	8,476	5,580	226	1,143	43,924
Monroe	8,633	5,140	735	1,726	42,798
Montgomery	20,488	12,493	177	2,602	113,938
Morgan	5,597	3,547	146	714	7,608
Newton	1,592	910	68	107	8,470
Noble	25,368	16,024	200	2,468	138,586
Ohio	1,690	1,494	36	109	7,862
Orange	6,721	4,865	176	632	29,454
Owen	13,749	6,075	372	2,430	66,720
Parke	14,008	7,001	581	2,605	95,449
Perry	5,782	1,653	142	342	29,734
Pike	4,453	3,460	207	350	24,461
Porter	4,073	2,185	103	332	25,228
Posey	2,580	1,271	71	197	14,971
Pulaski	5,531	3,277	124	565	30,457
Putnam	8,916	5,781	384	1,067	51,273
Randolph	5,567	4,372	113	371	33,308
Ripley	3,943	3,130	209	231	18,185
Rush	6,921	4,051	165	762	35,156
Scott	1,013	631	70	141	5,093
Shelby	3,420	2,328	253	419	21,065
Spencer	2,072	1,449	138	160	8,958
Starke	1,067	807	32	175	6,315
Steuben	26,369	12,565	93	1,838	147,084
St. Joseph	8,464	4,408	120	781	48,193
Sullivan	12,494	6,682	397	1,694	56,434
Switzerland	3,576	2,981	186	334	16,529
Tippecanoe	6,208	4,093	123	896	38,084
Tipton	4,519	2,813	234	510	20,062
Union	2,296	1,575	123	344	15,597
Vanderburgh	568	437	18	55	1,016
Vermillion	2,556	1,167	44	460	16,014
Vigo	2,104	1,255	145	170	9,992
Wabash	10,759	8,249	74	724	68,395
Warren	5,808	3,040	91	1,098	39,652
Warrick	3,681	3,091	88	343	16,906
Washington	10,058	8,263	354	1,152	47,176
Wayne	4,056	3,110	215	342	24,889
Wells	9,627	6,578	95	562	56,055
White	3,527	2,197	51	274	18,039
Whitley	14,325	9,988	77	1,115	83,492
Total	683,814	431,497	18,144	74,998	3,687,547
Total, 1896	741,743	482,221	21,365	45,308	4,075,275

HORSES, MULES AND NEAT CATTLE.

Number by Counties, July 1, 1897.

COUNTIES.	Horses.		Mules.		Neat Cattle.	
	Number	Died During Year.	Number	Died During Year.	Milch Cows.	Other Cattle.
Adams	6,878	141	71	12	5,932	5,046
Allen	11,574	228	88	9	11,002	7,987
Bartholomew	7,306	258	1,763	159	4,485	5,216
Benton	8,088	349	386	13	3,411	6,514
Blackford	4,261	280	145	2	2,449	2,540
Boone	11,511	284	276	10	7,454	9,809
Brown	3,324	124	593	62	2,201	2,051
Carroll	8,333	257	296	17	5,896	6,084
Cass	7,677	250	269	12	6,385	5,254
Clark	5,635	187	894	35	4,554	3,503
Clay	6,930	156	806	35	5,332	5,788
Clinton	9,478	258	194	11	6,181	7,071
Crawford	3,144	46	439	6	2,511	1,743
Daviess	8,475	174	1,488	29	5,998	5,217
Dearborn	3,933	116	442	16	4,561	3,386
Decatur	7,971	198	1,080	38	4,290	6,508
Dekalb	6,740	164	56	4	5,329	4,563
Delaware	9,792	569	227	21	6,440	6,687
Dubois	4,885	156	898	25	4,176	4,612
Elkhart	10,019	220	94	18	7,627	5,408
Fayette	3,911	125	161	14	2,449	3,175
Floyd	2,232	89	242	15	2,611	1,299
Fountain	7,440	225	444	26	4,247	6,020
Franklin	6,134	160	380	22	4,968	4,499
Fulton	6,469	207	97	2	4,639	4,209
Gibson	7,328	326	2,073	93	4,679	5,924
Grant	9,996	247	342	13	6,882	6,268
Greene	8,550	235	1,280	39	5,423	8,964
Hamilton	9,345	296	314	17	6,845	7,614
Hancock	7,516	237	195	16	5,037	5,023
Harrison	7,332	247	524	33	5,207	3,557
Hendricks	8,588	259	597	12	6,240	11,494
Henry	9,239	314	185	19	6,883	6,891
Howard	8,145	277	215	3	5,135	5,011
Huntington	9,091	244	164	10	6,347	6,550
Jackson	4,980	142	2,156	35	4,343	5,591
Jasper	8,210	537	830	34	4,604	10,032
Jay	8,300	197	144	7	5,469	5,878
Jefferson	6,244	184	756	21	4,662	4,052
Jennings	4,753	135	673	26	4,640	3,758

COUNTIES.	Horses.		Mules.		Neat Cattle.	
	Number.	Died during year.	Number.	Died during year.	Milch cows.	Other cattle.
Johnson	7,856	236	708	12	5,091	8,140
Knox	7,017	283	2,120	58	5,352	8,964
Kosciusko	9,265	240	158	6	7,082	6,399
Lagrange	6,573	137	54	2	4,781	4,503
Lake	7,609	350	124	....	9,832	5,826
Laporte	9,048	358	153	6	9,053	5,454
Lawrence	5,755	156	957	29	3,972	7,524
Madison	9,696	267	261	28	6,534	7,606
Marion	14,423	419	994	22	10,016	5,267
Marshall	8,534	235	118	14	6,677	4,923
Martin	4,533	141	501	22	3,131	3,776
Miami	8,402	265	167	20	6,353	7,326
Monroe	4,769	82	595	14	3,213	4,901
Montgomery	12,473	406	650	20	7,128	10,792
Morgan	7,482	258	664	44	4,572	6,191
Newton	6,086	246	474	16	4,204	5,407
Noble	7,915	205	151	1	6,002	6,266
Ohio	1,053	24	236	1	1,103	738
Orange	6,750	151	1,145	7	4,129	3,845
Owen	5,423	170	926	7	4,145	6,481
Parke	7,985	253	693	26	5,955	7,774
Perry	3,995	156	394	28	2,795	2,219
Pike	5,817	199	1,328	53	2,891	4,023
Porter	6,950	190	88	5	8,218	5,439
Posey	5,641	227	2,798	97	3,660	4,431
Pulaski	6,386	217	197	8	5,247	5,115
Putnam	9,434	224	821	26	5,744	12,095
Randolph	9,598	317	268	9	6,850	6,251
Ripley	6,002	165	607	18	6,729	4,406
Rush	9,407	364	269	11	4,653	6,496
Scott	2,558	64	360	8	1,988	1,336
Shelby	9,121	381	412	19	5,097	5,042
Spencer	6,483	238	1,945	110	4,252	3,347
Starke	3,328	267	126	17	3,344	2,622
Steuben	5,134	108	67	....	4,506	3,534
St. Joseph	10,063	339	113	1	8,716	4,136
Sullivan	10,306	292	770	14	6,114	7,689
Switzerland	3,419	71	503	5	2,439	1,383
Tippecanoe	11,771	450	473	14	6,057	6,828
Tipton	6,115	198	208	31	3,994	4,810
Union	3,013	80	125	....	2,126	2,986
Vanderburgh	5,166	181	2,401	110	4,273	1,104
Vermillion	4,828	150	323	16	2,731	4,037
Vigo	10,135	315	1,079	30	4,848	4,259
Wabash	7,578	215	142	1	5,170	5,809
Warren	7,253	246	602	27	2,912	5,733
Warrick	6,992	322	2,515	61	4,007	3,127
Washington	7,423	219	1,311	32	5,946	5,712
Wayne	9,058	244	240	16	6,185	5,989
Wells	7,831	263	143	5	5,680	5,372
White	9,442	391	543	19	5,799	8,697
Whitley	5,670	135	106	1	4,633	5,562
Total	**664,331**	**21,208**	**56,443**	**2,138**	**472,553**	**498,488**
Total, 1896	**692,917**	**22,951**	**60,075**	**2,054**	**486,096**	**495,066**

SWINE.

Number, and Number Died for the Year Ending July 1, 1897.

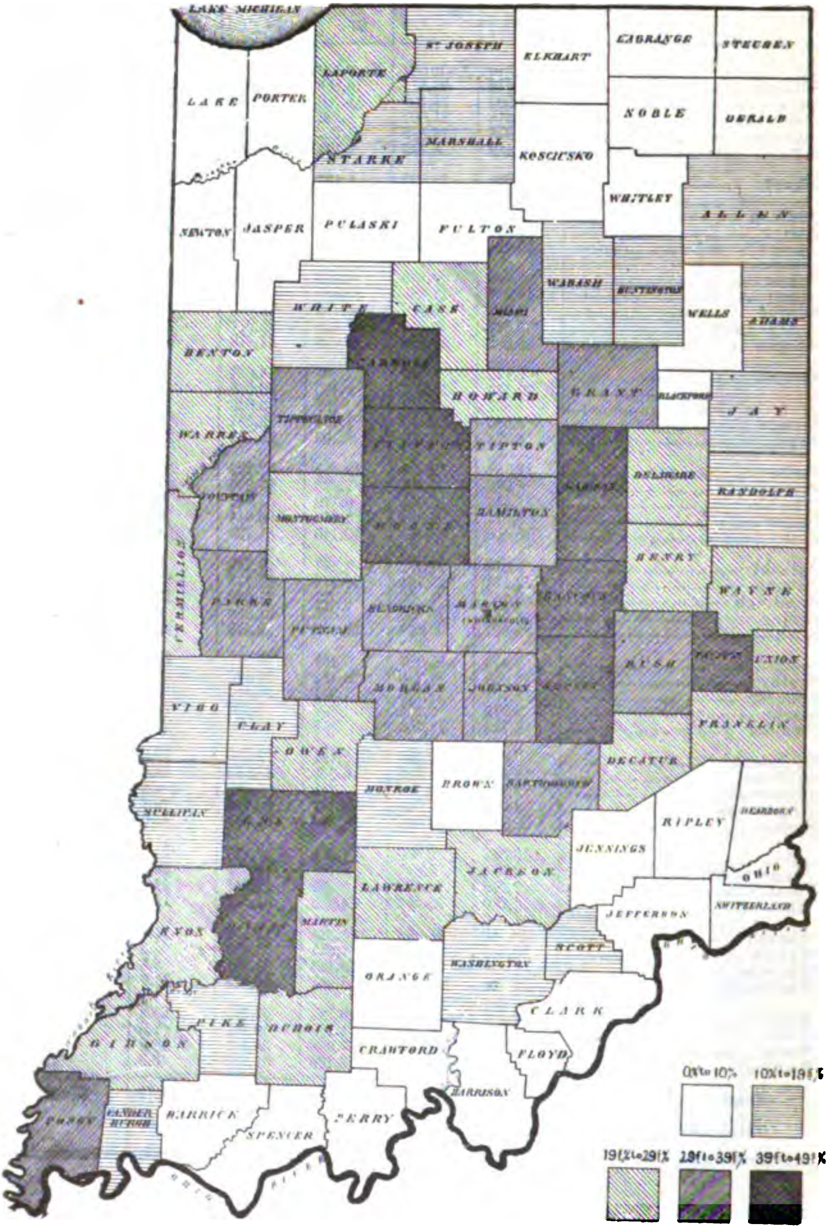
COUNTIES.	Pigs under three months.	Hogs over three months.	Hogs died past year.	Total number of swine.	Per cent. of swine that died.	Amount of loss sustained by disease—$6.00 each average.
	Number.	Number.	Number.			
Adams	18,931	20,722	4,530	44,183	10.2	$27,180
Allen	24,686	28,262	6,216	59,164	10.5	37,296
Bartholomew	12,589	15,495	13,168	41,252	31.9	79,008
Benton	7,243	9,431	6,411	23,085	27.7	38,466
Blackford	8,075	8,405	1,699	18,179	9.3	10,194
Boone	33,509	27,629	43,733	104,871	41.7	262,398
Brown	5,939	6,545	929	13,413	6.9	5,574
Carroll	20,762	18,132	27,205	66,099	41.1	163,230
Cass	16,705	18,456	12,235	47,396	25.8	73,410
Clark	7,455	10,052	1,200	18,707	6.4	7,200
Clay	12,747	16,411	6,042	35,200	17.1	36,252
Clinton	23,907	22,036	33,414	79,357	42.1	200,484
Crawford	2,347	6,131	395	8,873	4.4	2,370
Daviess	11,620	15,569	19,039	46,228	41.1	114,234
Dearborn	3,771	4,498	609	8,878	6.7	3,654
Decatur	14,242	16,166	12,228	42,636	28.7	73,368
Dekalb	17,314	14,882	1,261	33,457	3.8	7,566
Delaware	25,659	25,329	13,453	64,441	20.9	80,718
Dubois	9,128	11,399	6,761	27,288	24.7	40,566
Elkhart	12,615	14,484	1,872	28,971	6.4	11,232
Fayette	9,298	8,322	12,922	30,542	42.3	77,532
Floyd	1,918	2,737	372	5,027	7.4	2,232
Fountain	17,412	15,813	18.957	52,182	36.3	113,742
Franklin	10,540	11,596	7,883	30,019	26.2	47,298
Fulton	14,248	15,457	3,098	32,803	9.4	18,588
Gibson	16,190	24,168	17,183	57,541	29 3	103,098
Grant	27,166	21,448	26,594	75,208	35.4	159,564
Greene	11,926	14,649	23,315	49,890	46.7	139,890
Hamilton	29,831	23,132	27,232	80,195	34.0	163,392
Hancock	19,108	14,876	27,595	61,579	44.8	165,570
Harrison	8,032	14,828	2,013	24,873	8.0	12,078
Hendricks	26,617	22,972	26,562	76,151	34.9	159,372
Henry	27,552	23,110	19,478	70.140	27.8	116,868
Howard	27,686	21,489	16,607	65,782	25.2	99,642
Huntington	21,342	18,397	9,387	49,126	18.9	56,322
Jackson	10,456	15,630	9,699	35,785	27.9	58,194
Jasper	11,181	11,638	1,470	24,289	6.1	8,820
Jay	22,478	19,160	8,288	49.926	16.6	49,728
Jefferson	5,645	10,294	1,353	17,292	7.8	8,118
Jennings	7,691	10,280	1,599	19,570	8.1	9,594

COUNTIES.	Pigs under three months.	Hogs over three months.	Hogs died past year.	Total number of swine.	Per cent. of swine that died.	Amount of loss sustained by disease—$6.00 each average.
	Number.	Number.	Number.			
Johnson	19,512	23,671	18,568	61,651	30.5	$111,408
Knox	17,993	22,106	11,789	51,888	22.7	70,734
Kosciusko	21,815	21,907	1,982	45,704	4.3	11,892
Lagrange	15,278	14,910	1,292	31,480	4.6	7,752
Lake	6,489	8,712	1,197	16,398	7.3	7,182
Laporte	8,205	12,013	5,104	25,322	20.1	30,624
Lawrence	6,907	10,634	6,647	24.188	27.5	39,882
Madison	23,286	20,785	30,774	74,845	41.1	184,644
Marion	11,907	12,787	15,336	40,030	38.3	92,016
Marshall	15,424	19,408	5,391	40,223	13.4	32,346
Martin	5,629	8,499	4,712	18,840	25.0	28,272
Miami	19,237	17,365	17,245	53,847	32.0	103,470
Monroe	7,207	8,860	3,766	19.833	18.9	22,596
Montgomery	33,847	34,012	27,218	95,077	28.6	163,308
Morgan	16,392	19,509	16,018	51,919	30.8	96,108
Newton	7,172	9,745	1,104	18,021	6.1	6,624
Noble	20,178	17,967	1,380	39,525	3.5	8,280
Ohio	1,562	1,951	107	3,620	2.9	642
Orange	6,595	10,492	1,494	18,581	8.4	8,964
Owen	8,374	11,279	6,100	25,753	23.7	36,000
Parke	17,157	19,424	15,658	52,239	29.9	93,948
Perry	4,980	9,247	1,073	15,300	7.0	6,438
Pike	11,452	15,015	6,376	32,843	19.4	38,256
Porter	8,871	9,962	1,811	20,644	8.7	10,866
Posey	10,468	11,185	10,140	31,793	31.9	60,840
Pulaski	9,376	11,772	1,111	22,259	5.0	6,666
Putnam	22,175	23,724	19,879	65,778	30.2	119,274
Randolph	30,765	31,290	8,977	71,032	12.6	53,862
Ripley	8.638	10,896	1,816	21,350	8.5	10,896
Rush	32,827	27,499	32,153	92,479	35.8	192,918
Scott	2,853	3,597	767	7,217	10.6	4,602
Shelby	18,350	17,738	23,482	59,570	40.0	140,892
Spencer	7,794	14,712	1,911	24,417	7.8	11,466
Starke	2,979	3,285	856	7,120	12.0	5,136
Steuben	13,722	12,708	449	26,879	1.7	2,694
St. Joseph	7,325	10,690	2,181	20,196	10.8	13.086
Sullivan	18,689	23,521	6,728	48,938	13.8	40,368
Switzerland	2,912	3,741	314	6,967	4.5	1,884
Tippecanoe	18,021	18,010	23,447	59,478	39.4	140,682
Tipton	20,706	18,092	21,899	60,697	36.0	131,394
Union	13,647	9,859	7,214	30,720	23.5	43,284
Vanderburgh	3,591	5,541	2,177	11,309	19.2	13,062
Vermillion	7,773	10,076	5,032	22,881	22.0	30,192
Vigo	11,240	15,458	4,616	31,314	14.8	27,696
Wabash	19,146	17,179	4,824	41,149	11.2	28,944
Warren	13,510	12,783	7,615	33,908	22.5	45,690
Warrick	9,456	13,462	2,133	25,051	8.5	12,798
Washington	12,989	19,082	3,947	36,018	11.0	23,682
Wayne	22,501	18,539	16,125	57,165	28.2	96,750
Wells	25,664	26,403	4,100	56,167	7.3	24,600
White	14,762	16,431	7,255	38,448	18.8	43,530
Whitley	14,520	14,486	2,160	31,166	6.9	12,960
Total	1,327,429	1,411,949	899,457	3,638,835	24.71	$5,396,742
Total, 1896	1,205,916	1,472,382	580,260	3,258,508	17.80	

HOG CHOLERA GRAPHIC.

Showing by Counties the Greatest Fatalities in Year Ending May, 1897.

[See Marginal Explanation.]



WHEAT AND CORN.

Area and Production for 1898.

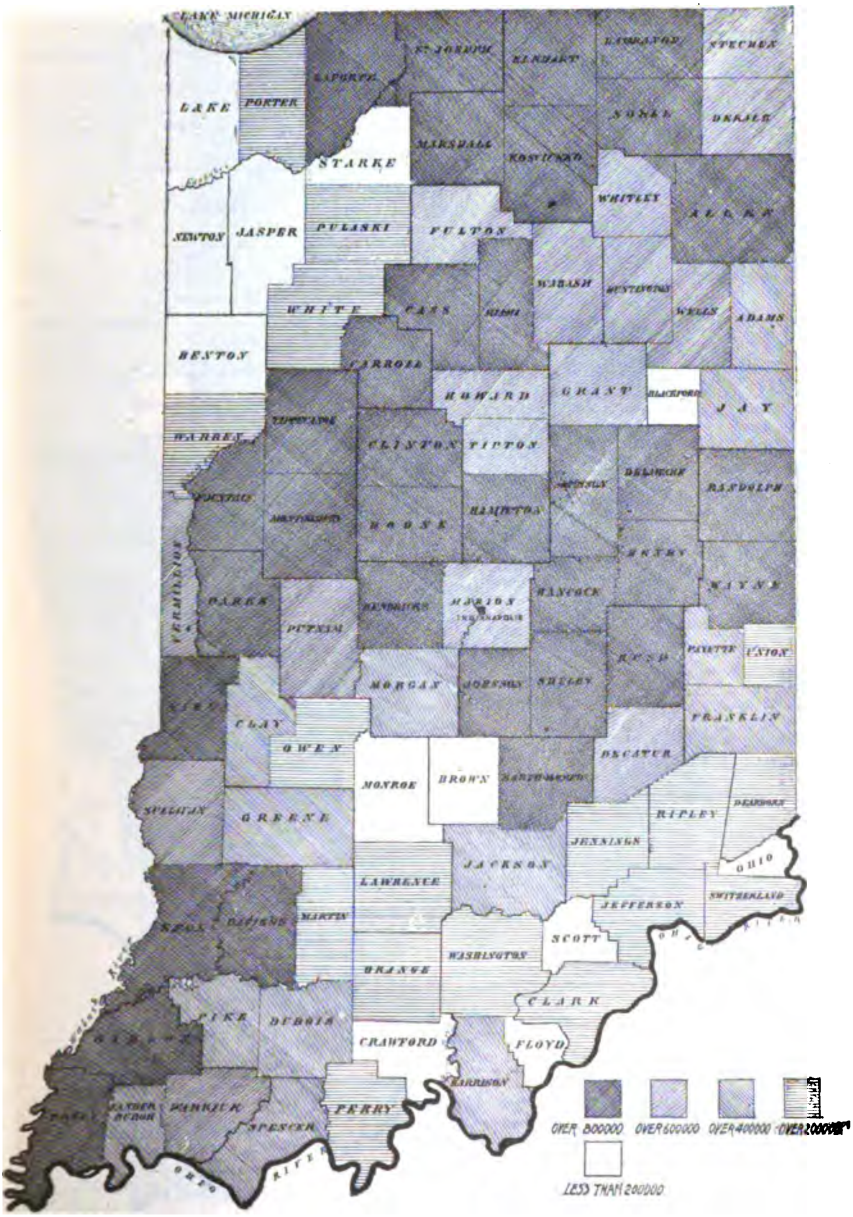
COUNTIES.	Wheat, 1898.			Corn, 1898.		
	Acres.	Bushels.	Yield per acre.	Acres.	Bushels.	Yield per acre.
Adams	25,581	409,296	16	36,107	1,227,638	34
Allen	40,232	804,640	20	52,130	1,876,680	36
Bartholomew	52,862	634,344	12	49,553	1,833,461	37
Benton	12,224	17,136	14	103,850	4,154,000	40
Blackford	9,284	120,692	13	19,257	770,280	40
Boone	51,668	826,688	16	63,429	2,473,731	39
Brown	8,777	105,324	12	15,228	487,296	32
Carroll	50,483	1,009,660	20	45,987	1,793,493	39
Cass	47,972	911,468	19	46,978	1,832,142	39
Clark	19,719	374,661	19	28,587	886,197	31
Clay	20,180	343,060	17	36,634	1,172,388	32
Clinton	57,760	924,160	16	64,890	3,049,830	47
Crawford	11,816	153,608	13	21,193	614,597	29
Daviess	43,597	784,746	18	47,738	1,623,092	34
Dearborn	21,315	341,040	16	20,044	621,364	31
Decatur	38,346	690,228	18	41,640	1,582,320	38
Dekalb	27,830	584,430	21	28,348	1,077,224	38
Delaware	43,132	776,376	18	68,517	2,740,680	40
Dubois	38,244	650,148	17	26,396	871,068	33
Elkhart	52,574	893,758	17	36,226	1,376,588	38
Fayette	25,939	492,841	19	24,468	856,380	35
Floyd	7,312	124,304	17	9,038	307,292	34
Fountain	35,498	532,470	15	52,725	1,845,375	35
Franklin	31,912	502,504	17	31,922	1,181,114	37
Fulton	38,537	770,740	20	37,772	1,510,880	40
Gibson	73,245	1,098,675	15	51,183	1,647,856	32
Grant	33,557	604,026	18	54,239	2,169,560	40
Greene	23,546	353,190	15	55,295	1,990,620	36
Hamilton	45,994	919,880	20	60,661	2,183,796	36
Hancock	36,165	650,970	18	53,654	2,199,814	41
Harrison	42,862	771,516	18	34,746	1,077,126	31
Hendricks	37,534	525,476	14	53,726	2,149,040	40
Henry	46,468	697,020	15	51,541	2,113,181	41
Howard	34,118	648,242	19	44,284	2,214,200	50
Huntington	37,490	674,820	18	41,046	1,518,702	37
Jackson	31,288	500,608	16	43,255	1,297,650	30
Jasper	4,166	45,862	11	67,372	2,425,392	36
Jay	23,754	380,064	16	45,380	1,588,300	35
Jefferson	22,274	334,110	15	30,104	963,328	32
Jennings	20,097	241,164	12	29,588	946,816	32

COUNTIES.	Wheat, 1898.			Corn, 1898.		
	Acres.	Bushels.	Yield per acre.	Acres.	Bushels.	Yield per acre.
Johnson	44,702	749,934	17	45,417	1,998,348	44
Knox	67,720	1,015,800	45	64,052	2,818,288	44
Kosciuske	59,815	1,136,485	19	44,089	1,851,738	42
Lagrange	44,927	808,686	18	31,373	1,192,174	38
Lake	1,699	30,582	18	35,004	1,365,156	39
Laporte	48,177	867,186	18	49,292	1,528,052	31
Lawrence	12,868	167,284	13	26,166	811,146	31
Madison	47,479	949,580	20	67,090	2,884,870	43
Marion	32,845	591,210	18	42,079	1,767,318	42
Marshall	47,391	900,429	19	39,031	1,405,116	36
Martin	13,062	208,992	16	22,244	667,320	30
Miami	36,313	617,321	17	39,541	1,621,181	41
Monroe	11,245	179,920	16	20,414	673,662	33
Montgomery	55,715	891,440	16	73,640	3,608,360	49
Morgan	28,514	456,224	16	40,570	1,460,520	36
Newton	1,728	20,736	12	71,608	2,434,672	34
Noble	49,577	991,540	20	34,463	1,481,909	43
Ohio	7,549	83,039	11	6,477	194,310	30
Orange	13,799	220,784	16	28,989	753,714	26
Owen	11,672	128,392	11	21,131	760,716	36
Parke	34,386	515,790	15	45,117	1,669,329	37
Perry	19,361	309,776	16	22,582	790,370	35
Pike	40,761	652,176	16	32,586	1,238,268	38
Porter	10,974	197,532	18	35,793	1,431,720	40
Posey	64,683	1,164,294	18	45,748	1,738,424	38
Pulaski	17,558	316,044	18	48,787	1,707,545	35
Putnam	30,387	486.192	16	44,898	1,706,124	38
Randolph	41,119	699,023	17	63,759	2,231,565	35
Ripley	28,227	423,405	15	35,342	1,060,260	30
Rush	55,515	1,054,785	19	56,321	2,421,803	43
Scott	16,707	250,605	15	18,303	457,575	25
Shelby	59,650	1,014,050	17	64,472	2,256,520	35
Spencer	51,619	825,904	16	39,222	1,411,992	36
Starke	5,760	69,120	12	20,501	717,535	35
Steuben	27,456	549,120	20	25,461	1,043,901	41
St. Joseph	55,981	839,715	15	38,679	1,237,728	32
Sullivan	33.630	538,880	16	51,583	2,063,320	40
Switzerland	10,743	161,145	15	12,821	384,630	30
Tippecanoe	58,865	1,000,705	17	102,065	3,776,405	37
Tipton	27,668	470,356	17	39,628	1,505,864	38
Union	21,610	345,760	16	20,244	728,784	36
Vanderburgh	34,700	589,900	17	23,322	979,524	42
Vermillion	25,047	400,752	16	36,993	1,220,769	33
Vigo	31,624	442,736	14	72,427	2,390,091	33
Wabash	48,267	917.073	19	40,075	1,562,925	39
Warren	15,474	201,162	13	68,174	2,590,612	38
Warrick	56,333	957,661	17	41,748	1,294,188	31
Washington	21,499	386,982	18	38,391	1,228,512	32
Wayne	42,148	758,664	18	49,492	1,930,188	39
Wells	28,947	434,205	15	41,923	1,551,151	37
White	17,251	258,765	15	83,379	2,584.749	31
Whitley	27,183	489,294	18	27,894	1,059,972	38
Total	3,012,332	51,001,080	…………	3,915,131	145,501,404	…………

WHEAT GRAPHIC.

Showing by Counties the Largest Wheat Producers.

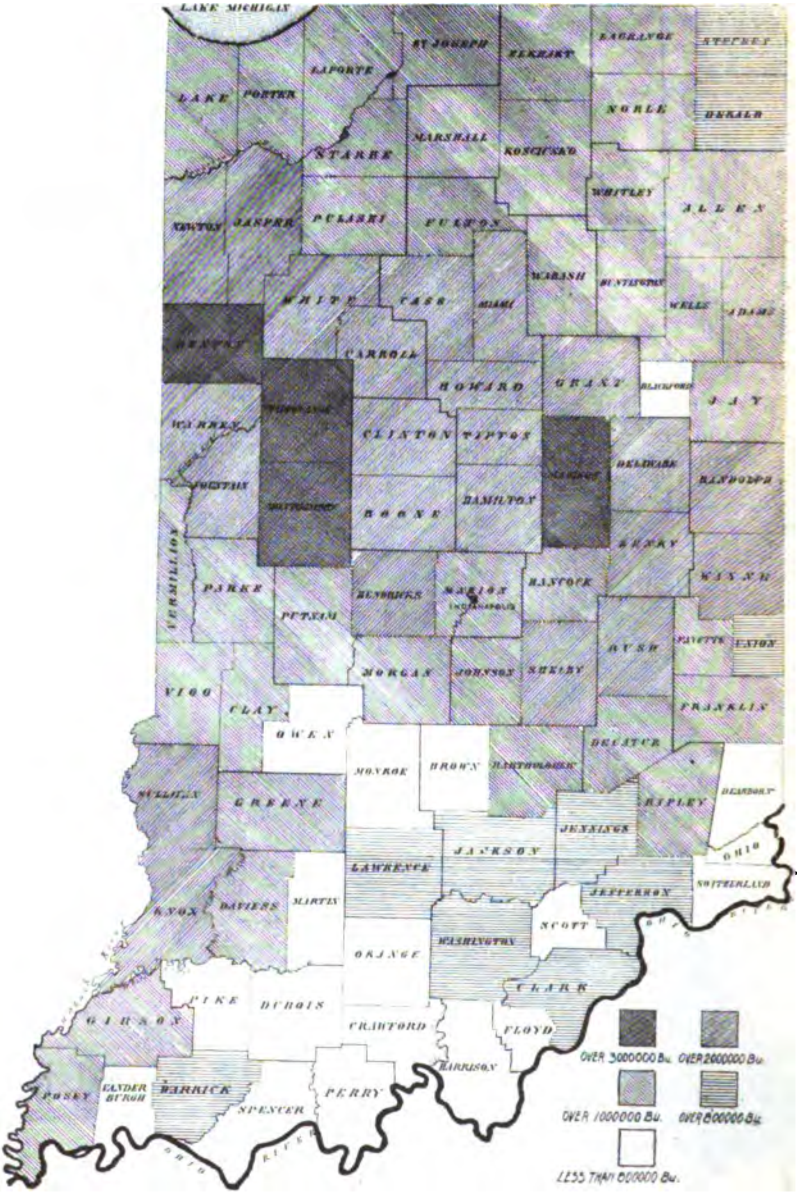
[See Marginal Explanation.]



CORN GRAPHIC.

Showing by Counties the Largest Corn Producers.

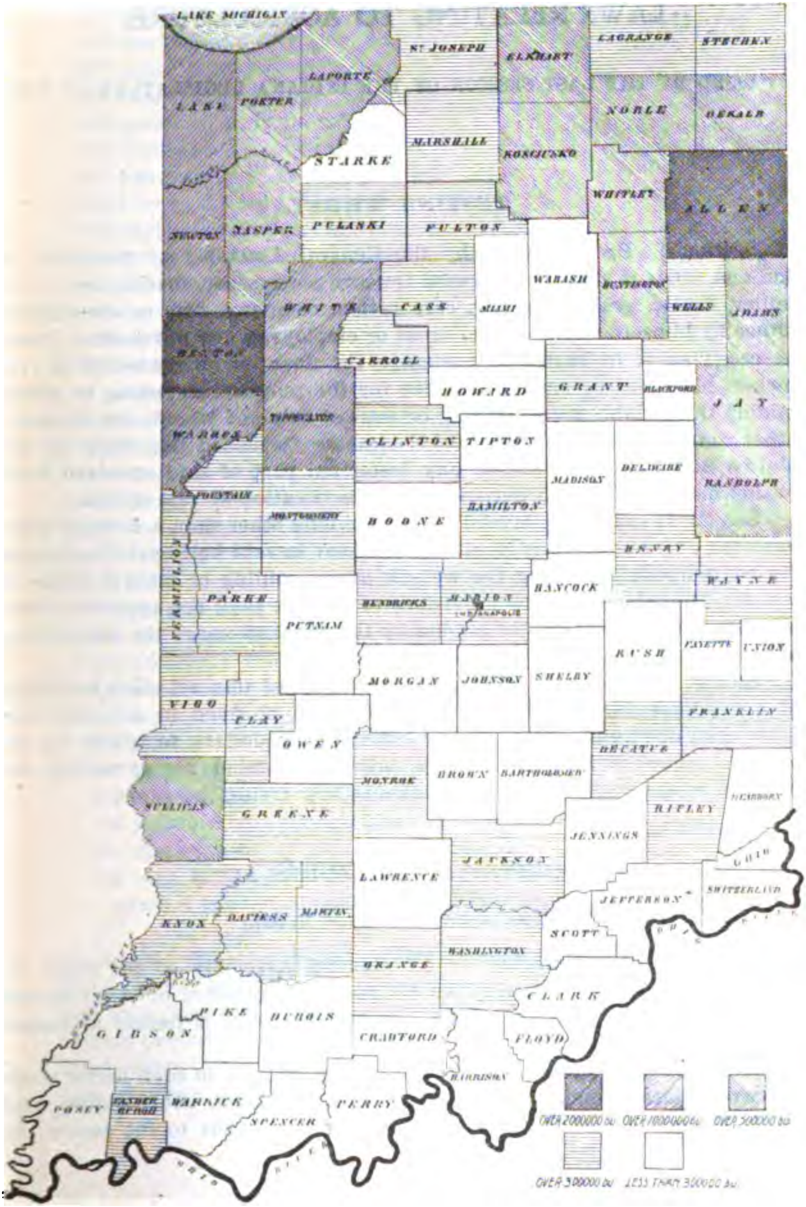
[See **Marginal Explanation.**]



OATS GRAPHIC.

Showing by Counties the Largest Oats Producers.

[See Marginal Explanation.]



LAWS RELATING TO AGRICULTURE.

PASSED BY THE LAST SESSION OF THE INDIANA LEGISLATURE IN 1897.

TESTING WHEAT.

Section 1. Be it enacted by the General Assembly of the State of Indiana, That it shall be unlawful for any person, commission merchant, miller, dealer, grain inspector, corporation, company, firm or association, either by himself, itself, officer, agent or employe, when purchasing wheat or receiving it in barter or exchange for flour or otherwise, from the owner, his agent or employe, to use for the purpose of testing or determining the weight, grade, milling or market value of wheat, any measure other than the standard half-bushel measure furnished this State by the United States; and the use of any fractional part of said standard half-bushel measure for such purpose will be a violation of this section.

Sec. 2. It shall be unlawful to use anything other than a straight stick with the edges square for leveling the wheat in said half-bushel measure, for the purpose of testing the weight, grade, milling or market value of wheat: Provided, That the provisions of this act shall not apply to wheat or grain that is inspected or graded by the car load under the regulations of any Board of Trade.

Sec. 3. Any person violating the provsions of this act shall be guilty of a misdemeanor, and upon conviction, shall be fined in any sum not more than one hundred dollars nor less than ten dollars, to which can be added imprisonment in the county jail for a period not exceeding six months, in the discretion of the Judge or jury trying the same.

WEIGHTS AND MEASURES ACT.

[H. 96. Approved February 11, 1897.]

Section 1. Be it enacted by the General Assembly of the State of Indiana, That an act entitled "An act for the regulation of weights and measures, approved March 9, 1885," be and the same is hereby amended to read as follows:

Section 1. The avoirdupois weight of beef or pork in each barrel shall be two hundred pounds; and of flour in each barrel, one hundred and ninety-six pounds; of sorghum molasses, eleven pounds to the gallon; of hay or straw, two thousand pounds shall be given and taken for a ton. A bushel of the respective articles hereinafter mentioned shall mean the amount of weight, avoirdupois, in this section specified as follows:

Of wheat, sixty pounds;
Of buckwheat, fifty pounds;
Of oats, thirty-two pounds;
Of beans, sixty pounds;
Of potatoes, sixty pounds;
Of clover seed, sixty pounds;
Of hemp seed, forty-four pounds;
Of blue grass seed, fourteen pounds;
Of castor beans, forty-six pounds;
Of dried peaches, thirty-three pounds;
Of dried apples, twenty-five pounds;
Of onions, forty-eight pounds;
Of salt, fifty pounds;
Of mineral coal, mined without and sold within the State, eighty pounds;
Of coal mined within the State, eighty pounds;
Of timothy seed, forty-five pounds;
Of rye, fifty-six pounds;
Of barley, forty-eight pounds;
Of corn meal, fifty pounds;
Of cranberries, thirty-three pounds;
Of millet seed, fifty pounds;
Of orchard grass seed, fourteen pounds;
Of malt rye, thirty-five pounds;
Of middlings, fine, forty pounds;
Of middlings, coarse, thirty pounds;
Of osage orange, thirty-three pounds;
Of parsnips, fifty-five pounds;
Of sweet potatoes, fifty-five pounds;
Of turnips, fifty-five pounds;
Of pop-corn, seventy pounds;
Of shelled corn, fifty-six pounds;
Of corn in the ear, seventy pounds, until the first of December next after it is grown, and after that date, sixty-eight pounds.

Sec. 2. Whoever, when buying or selling by weight, buys or sells any of the foregoing articles or commodities enumerated in section one of this act, at a measure differing in weight from the standard of measures therein prescribed and fixed, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not more than twenty-five dollars nor less than one dollar.

DESTROYING NOXIOUS WEEDS.

[H. 249. Approved March 3, 1897.]

Section 1. Be it enacted by the General Assembly of the State of Indiana, That all land owners through or along whose lands public highways are laid out and extended, shall, between the first day of July and the twentieth day of August in each year, cause all briers, thistles, burrs, docks and other noxious weeds growing along said highway and contiguous to their lands, to be cut down and destroyed for the length and distance the said highway shall extend along or through their lands.

Sec. 2. Any land owner through or along whose lands public highways are laid out and extended, who shall in compliance with section 1, of this act, cut down and destroy for the length and distance the said highway shall extend along or through his lands, all briers, thistles, burrs, docks and other noxious weeds growing along said highway, or contiguous thereto, shall be allowed for such work or service the sum of one dollar and twenty-five cents per day, eight hours to constitute a day, and proportionate thereto; the work to be done under the direction of the Supervisor in charge of said road district, and to be credited upon his road taxes as other work is credited.

Sec. 3. That any such land owner who neglects, or refuses, after the said twentieth day of August in each year, to comply with the requirements specified in first section of this act, the Supervisor in charge of said road district shall hereby be empowered to secure the services of any resident property owner of said road district to cut down and destroy such briers, thistles, burrs and docks and other noxious weeds, said resident property owner to be allowed for such work or service the sum of one dollar and twenty-five cents per day, eight hours to constitute a day, and proportionate thereto, and to be credited upon his road taxes as other work is credited.

LIVE STOCK INSURANCE.

[S. 101. Approved March 4, 1897.]

Section 1. Be it enacted by the General Assembly of the State of Indiana, That any number of persons, not less than five, may form an association for the mutual insurance of the horses, mules, asses, cattle, sheep, hogs, and other domestic live stock of its members, against loss by death from disease or accident, or against partial loss by accidental injury, or by theft: Provided, That no company organized under this act shall do any business, take any risks or make any insurance in more than seven counties, which counties shall be contiguous to one another, and shall be set forth in the articles of association.

Sec. 2. The articles for forming such association shall be signed by the persons who at first form such association and be recorded in the office of the Recorder of the county in which the principal office is situated; such association shall be managed by such officers as their articles may provde for and in the election of such officers each member shall be entitled to one vote.

The Secretary shall give bond in the sum of five thousand dollars for the faithful discharge of his duties and accounting for all moneys which shall come into his hands, and the Treasurer shall give bond in like manner in the sum of not less than twenty-five thousand dollars, to be approved by the Auditor of the county in which the principal office is situated; said Treasurer to collect all assessments made by such association. Every such association may sue or be sued by such name as may be set forth in the articles of association, and shall have all other powers of corporate bodies.

Sec. 3. The persons holding the offices or performing the duties of Secretary and Treasurer of such associations shall on the first Mondays of January and July of each year make out a sworn statement in writing, setting forth the number of policies issued by the association, the amount issued on each kind of live stock, the number of losses paid and the aggregate amount thereof; the number of losses sustained and unpaid and the aggregate amount thereof; and the amount of money in the hands of the Treasurer at the time of making such report; for the filing and recording of each of which statements the association shall pay to the Recorder of the county in which the principal office is situated, the sum of one dollar. He shall also file said report with the Auditor of State, who shall receive like compensation and who shall have power to increase bonds at any time.

Sec. 4. Any association organized under the provisions of this act shall be entitled to issue policies of insurance to any of its members against loss of live stock by death from disease or accident, or against partial loss by accident or theft.

PREVENT SPREAD OF SWINE DISEASE.

[S. 37. Approved March 5, 1897.]

Section 1. Be it enacted by the General Assembly of the State of Indiana, That it shall be the duty of all railroad companies and all stock yard associations operating in this State to thoroughly cleanse and disinfect all cars in which hogs are shipped to their yards, immediately after unloading the hogs from the cars, and to keep their pens in which hogs are kept thoroughly cleansed and disnfected. And it shall be the duty of the managers of all fair grounds in the State, where swine are placed on exhibition, to thoroughly cleanse and disinfect and to keep cleansed and disinfected all the pens in which swine are kept, and all crates in which swine are brought to such fair shall be cleansed and disinfected immediately upon their being received at the fair grounds. And it shall be the duty of the managers of such fairs, before receiving any swine into such pens, to require and take from the proposed exhibitor an affidavit that the swine presented for exhibition have not within the two months last past, been exposed to any swine disease, and that he did before shipping such swine wash the same with a solution containing not less than one-tenth part of pure carbolic acid and that the car in which such swine were shipped was thoroughly cleansed and disinfected before said swine were loaded in it.

Sec. 2. That it shall be unlawful for any person to drive upon any public highway, or suffer to run at large or to ship in any vehicle or railroad car, any swine, knowing the same to be infected with any disease, but the breeder or owner of any herd of swine which becomes infected with any disease, may within five days after the first indication that such herd is so infected, separate and ship and market all well and healthy hogs from such herd, and it shall be the duty of all breeders and owners of hogs in this State which die with any disease to burn each carcass to ashes within ten hours after death.

Sec. 3. It shall be unlawful for any one owning or controlling swine, knowing the same to be infected with disease, to allow such swine to have access to any stream of running water in this State, so that the water in such running stream to which such diseased swine have had access may flow down through the lands of others from where such infected herd is kept.

Sec. 4. That any manager of any railroad company or the manager of any stock yards, operating in this State, who shall fail or refuse to cleanse and disinfect the cars at such yards, or fail to keep their pens cleansed and disinfected as required by this act, and any managers of fair grounds who shall fail or refuse to cleanse and disinfect their pens and crates and require from the exhibitor the affidavit required in this act, and any person who drives upon any public highway or suffers to run at large or ships in any vehicle or railroad car any swine, knowing the same to be infected with disease, and any breeder or owner of any herd of swine which becomes infected with any disease who shall, after five days from the time he discovers said herd is so infected, ship and market hogs from such diseased herd or shall fail and refuse to burn the carcasses of hogs in such herd, dying from such disease as provided in this act; if any owner or owners of any such hog or shoat so dying with disease or any person or persons having the care or custody thereof having knowledge of the fact ten hours, or upon receiving notice thereof ten hours shall fail, neglect or refuse to comply with the provisions of the preceding section it shall be lawful for any person or persons to enter upon the premises, after notifying the owner of the same where the carcass or carcasses of any hog or shoat may be, and burn such carcass or carcasses, committing no unnecessary damage, and for each carcass so burned, he, she, or they may recover the sum of one dollar for each carcass so burned, in a civil action before any Justice of the Peace of the township where the defendant or one of the defendants resides, from the owner or owners of any such hog or shoat, or from any person or persons having the care and custody thereof; and any person who shall allow swine infected with any disease to have access to any stream of running water on his premises, then he and they or any person or persons who shall violate any of the provisions of this act, shall be deemed guilty of a misdemeanor and upon convicton before any court having criminal jurisdiction shall be fined in any sum not less than twenty-five dollars and not more than five hundred dollars.

PROTECTING SHEEP.

[H. 76. Approved March 6, 1897.]

Section 1. Be it enacted by the General Assembly of the State of Indiana, That the Township Assessor shall be required at the time of assessing the property of each property holder of his township as now required by law, to make diligent inquiry as to the number of dogs owned, harbored or kept by the person so assessed. And such person so assessed shall pay immediately to the Township Assessor the sum of one dollar for each male dog or spayed female dog. And the sum of two dollars for each additional male dog or spayed female dog. And the sum of three dollars for each female dog (unspayed) so owned, harbored or kept.

Sec. 2. The Township Assessor shall give to each person a receipt for such money paid him, which shall be designated for dog tax, which receipt shall show the person's name who owns, harbors or keeps the dog, the amount paid, and the number, description and kind of dogs paid for, and whether male or female, and the number of each, which receipt shall relieve the person or persons owning, keeping or harboring such dogs for the current year, extending one year from its date or until the next regular township assessment. Such Township Assessor shall keep a record of the person or persons owning dogs and a record of the dogs paid for. And he shall keep a stub record or copy of the receipts given by him for money paid him as dog tax; such stub record shall show the amount paid him, the number of dogs, both male and female, paid for, and the person's name, owning the dogs so paid for. And he shall within five days after the completion of the assessment of his township, each year turn over to the Township Trustee of his township all the records kept by him relating to the collecting and payment of dog tax, and a copy of all receipts given by him to persons having paid him money as dog tax, and all money received by him as dog tax.

Sec. 3. He shall report the amount collected by him as dog tax, and turned over to the Township Trustee of his township, to the County Auditor of his county within three days after making his report to the Township Trustee of his township. The County Auditor shall make a record of the same, and charge the amount against the Township Trustee of the proper township, as receipts from the dog fund.

Sec. 4. Any person who shall keep or harbor any dog, and shall not have paid the Township Assessor the tax as above specified and received his receipt for such payment, shall upon complaint of any resident of the county be subject to a fine of not less than five nor more than twenty dollars.

Sec. 5. It shall be the duty of the Township Assessor to keep a record of all dogs that shall not be paid for, by whom owned, harbored or kept, and the number of such dogs and the kind, whether male or female, and he shall report the same to the Township Trustee of his township at the time of making his other report, as above provided, whose duty it shall be to report the same to the Prosecuting Attorney of his county, or district, or his deputy, who shall bring an action before any Justice of the Peace of his county, or in the Circuit Court of his county, against such persons, upon conviction thereof, and he shall receive the sum of five dollars for each case so prosecuted and such fee shall be charged as part of the judgment and cost against such person so prosecuted: Provided, That if any person shall acquire, own, harbor or keep any dog after the Assessor shall have completed his assessment, he shall report such dog to and pay to the Township Trustee of his township the amount of dog tax as above provided and receive his receipt for the same, which receipt shall exempt him from further payment of dog tax on dogs described in said receipt, until the time of the next assessment of his township.

Sec. 6. If any Township Trustee or Township Assessor shall fail to perform the duties as above provided, they shall be liable to a fine of not less than ten nor more than twenty dollars.

Sec. 7. Every person liable to taxation in any township in the State of Indiana, and residing therein, when listed for taxation, shall make and subscribe to an oath to the Township Assessor, in which he shall state the number of dogs, spayed and unspayed, over the age of three months, owned, kept and harbored by such person, and any person who shall make a false statement to the Assessor or Township Trustee as to the number. kind and sex of such dogs so owned, kept or harbored by him, shall be fined in any amount not exceeding one hundred dollars.

Sec. 8. Any dog that is known to have killed, maimed, chased or worried any sheep, cattle, horses, swine or other live stock, or fowls, unless accompanied by his master or some other person, may be killed by any person, and any person who shall own, keep or harbor any dog, after he knows that such dog has killed or maimed, chased or worried any sheep, cattle, horses, swine or other live stock, or fowls shall be fined in any sum not less than ten nor more than fifty dollars.

Sec. 9. It shall be a misdemeanor for any person who does not hold the Township Assessor's or Township Trustee's receipt, showing that the required tax has been paid for the same, as provided in this act, to keep, harbor, board or feed, or permit any dog to stay about this, her or their premises, and upon complaint they shall be liable to a fine in any sum not exceeding ten dollars.

Sec. 10. Any person owning or harboring any female dog, who shall allow such female dog to run at large during any period of rutting or when in heat shall be fined not less than five nor more than twenty dollars.

Sec. 11. All money derived by the taxing of dogs by the Township Assessor or Township Trustee as provided by this act, shall constitute a fund known as the Dog Fund, which shall be used for the payment of damages sustained by owners of sheep, cattle, horses, swine and other live stock, or fowls killed, maimed or damaged by dogs, within any township of the State of Indiana. Each Township Trustee shall collect all fines belonging to his township from the different Courts where such fines have been assessed and paid: Provided, That no damage shall be assessed or paid on sheep except where individual damage exists or is shown.

Sec. 12. The owners of sheep, cattle, swine, horses, and other live stock or fowls killed, maimed or damaged by dogs, shall within ten days from the time thereof, report to the Trustee of his township, under oath, in which he shall state the number and age as he believes, and the value of such stock or fowls so killed or damaged, and the damages sustained on account of such stock or fowls killed or maimed, in which affidavit he must be joined by two disinterested and reputable freeholders, or householders, and any person or persons who shall make any false statements of such damages shall upon conviction be fined in any sum, not exceeding one hundred dollars, to which shall be added imprisonment in the county jail for any term not exceeding thirty days: Provided, however, That no appraisement shall exceed the actual cash value for which such live stock or fowls would have sold for if placed on the market at the time such damage was sustained: Provided, further, That if any Township Trustee deems the appraisement of such live stock or fowls so killed or maimed to be excessive he shall tender to the owner or owners, or credit upon his books such amount which in his judgment is equal to the injuries sustained and if in any action at law by the owners thereof for the recovery of such damages, said owner shall fail to recover a judgment exclusive of costs for an amount greater than the amount so tendered the defendant shall recover costs of such suit.

Sec. 13. The Trustee shall register all losses in the order in which they are reported: Provided, That no person shall receive pay for sheep, horses, cattle, swine or other live stock or fowls killed or maimed by any dog or dogs owned or harbored by himself: Provided, further, That the Dog Fund heretofore collected shall be added to and applied with the fund arising under the provisions of this act. And when it shall so occur on the first Monday of March of any year in any township in the State of

Indiana that said fund shall accumulate to an amount exceeding one hundred dollars over and above orders drawn on the same, the surplus aforesaid shall be paid and transferred to the County Treasurer of the county in which such township is located and the fund arising from such surplus from the township of the county shall constitute a County Dog Fund and shall be distributed among the townships of the county in which the orders drawn against the Dog Fund exceed the money on hand. This distribution shall be made on the second Monday in March of each year, and if said County Dog Fund be insufficient to pay for all the live stock or fowls maimed or killed by dogs of all the townships the distribution shall be made in the ratio of the orders drawn against the Dog Fund of the townships and unpaid and unprovided for, which ratio shall be obtained from the report of the Trustees of the townships made to the Auditor of the county which it is hereby directed shall be made by each Township Trustee of the county upon the first Monday of March of each year, which report shall show all receipts into the Dog Fund of his township, and all orders drawn against the same in the order in which they were drawn. And when it shall occur upon the second Monday in March of any year that there is a surplus left of the County Dog Fund after provisions have been made for the payment for all the live stock or fowls killed or maimed, of all the townships of the county, such surplus shall be distributed for the schools of the county in the same manner the common school revenue of such county is distributed.

Sec. 14. If any dog shall be found roaming over the country unattended by his master or owner, or his owner's agent, it shall be lawful to kill such dog.

METEOROLOGICAL TABLES.

TABLE I.

Monthly and Annual Meteorological Summaries for 1897, as deducted from the Records of Observations made by the Weather Bureau at Indianapolis, Ind. Appropriate headings show the nature of the data in the columns immediately underneath.

1897. MONTHS.	Mean Barometer Reduced to Sea Level—Inches.	Mean Temperature—Degrees.	Relative Humidity—Per Cent.	Maximum Temperature—Degrees.	Minimum Temperature—Degrees.	Prevailing Direction of Wind.	Number of Clear Days.	Number of Partly Cloudy Days.	Number of Cloudy Days.	Average Cloudiness During the Month. Scale 0 to 10.	Number of Days on which 0.01 Inch or More of Precipitation Fell.	Total Amount of Precipitation—Inches.	Number of Days on which Min. Temp. Fell below Freezing.
January	30.190	25.0	78	64	—14	W	7	9	15	6.3	16	3.71	12
February	30.091	32.5	78	58	3	NE	7	8	13	6.4	10	2.37	5
March	30.052	42.9	73	65	24	NW	7	10	14	6.4	17	5.85	0
April	30.082	50.8	72	81	23	NW	7	12	11	6 1	13	4.83	0
May	30.040	58.0	75	85	34	NW	15	11	5	4.2	16	4.37	0
June	29.980	70.0	72	91	48	SW	17	13	0	3.4	11	3.70	0
July	29.942	77.0	76	99	55	NW	13	13	5	4.2	16	5.70	0
August	30.000	72.3	65	98	50	NW	11	12	8	4.8	4	0.42	0
September	30.161	71.4	51	96	41	SW	26	4	0	1.8	3	0.79	0
October	30.106	61.2	63	89	37	NE	21	6	4	2.9	5	0.45	0
November	30.126	43.6	75	68	16	S	7	6	17	6.7	12	6.87	0
December	30.128	31 2	79	62	6	NW	2	8	21	8.1	14	3.09	7
Annual means	30.074	53.0	71	79.7	27.0	NW	......	......	......	5.1	......	......	......
Annual totals							140	112	113		137	42.15	24

TABLE II.

Daily and Monthly Mean Temperature of Indianapolis, Indiana, for 1897. The Daily Means Were Made by Adding the Maximum and Minimum Temperature of Each Day Together and Dividing the Sum by Two. The Thermometers are 154.8 Feet Above Ground and Exposed in a Standard Shelter of the Weather Bureau Pattern.

DATE.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	52	28	38	46	38	62	78	83	80	74	50	31
2	57	32	46	46	37	66	80	84	70	70	48	28
3	51	30	40	54	44	65	84	86	70	66	48	35
4	31	29	32	60	52	58	86	77	70	66	53	32
5	19	35	50	50	62	62	86	74	75	72	48	25
6	16	36	34	44	68	67	84	71	74	62	44	22
7	24	32	32	45	70	60	86	72	76	60	48	34
8	32	30	48	38	72	58	86	77	80	67	54	46
9	37	27	51	39	68	60	86	76	80	59	48	52
10	34	32	42	38	66	62	83	73	81	62	46	56
11	28	33	44	41	65	76	71	70	82	65	44	44
12	26	34	40	46	63	74	67	69	82	62	34	36
13	28	40	32	52	60	79	62	72	82	64	42	39
14	32	37	32	44	48	80	66	74	82	75	52	40
15	31	35	34	46	52	80	74	76	84	78	60	35
16	38	40	38	42	52	76	70	64	80	71	48	35
17	45	48	45	43	59	75	73	64	63	56	34	22
18	25	34	56	52	64	79	74	67	60	56	38	13
19	28	36	60	45	68	75	76	66	61	60	47	20
20	32	45	52	85	70	68	73	64	52	58	56	28
21	30	41	51	56	51	60	76	67	56	52	53	25
22	24	38	56	66	59	66	80	64	63	52	37	20
23	16	26	44	66	63	74	80	68	64	54	29	12
24	5	27	34	68	52	73	77	70	68	55	32	14
25	—9	26	34	64	52	74	77	70	74	56	48	26
26	—6	18	33	59	56	66	78	70	74	58	46	30
27	2	12	32	52	60	64	73	76	63	62	30	26
28	2	27	41	64	58	72	74	75	61	60	36	38
29	9	....	49	69	57	82	74	83	66	47	28	34
30	14	....	52	50	58	81	76	71	72	52	24	36
31	23	....	56	....	54	....	77	70	....	52	....	26
Mean	25.0	32.4	42.9	50.8	58.8	70.0	77.0	72.5	71.5	61.4	43.5	31.1

TABLE III.

Daily and Monthly Precipitation at Indianapolis, Ind., for 1897, the Rain Gauge 146 Feet Above Ground.

DATE.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.29	.20	.01	.00	.01	.00	.06	.00	.52	.00	1.16	.00
2	.42	.20	.24	.11	.41	.03	T	T	.00	.00	.30	.01
3	.33	.00	.07	T	.10	.19	.00	.00	.00	.00	.00	.22
4	.34	T	.17	.63	.05	T	.00	.01	.00	.00	.00	.16
5	.04	.18	3.06	T	.00	.00	.00	T	.00	.00	.04	.04
6	T	.06	.00	T	.00	.00	.00	.00	.00	.00	.00	T
7	.00	T	.00	.01	.00	.63	.00	.00	.00	.00	.54	T
8	.03	.27	.14	.52	.08	.00	.18	.00	.00	.00	.64	.00
9	.00	.00	.49	1.17	.47	.00	.08	.00	.00	.00	.12	.00
10	.00	.00	T	T	.52	.00	.26	.00	.00	.00	.00	.17
11	.00	.04	T	.11	T	.58	1.62	.00	.00	.08	.04	.19
12	.00	.13	.01	.00	.01	.41	.00	.00	.00	.05	.00	.00
13	.32	.00	.00	.43	.02	.00	.18	.00	.00	.00	.00	.19
14	.08	.00	.06	.00	.06	.00	.03	T	.00	.00	.00	.03
15	T	T	.00	.00	1.15	.00	.00	.00	.00	.00	.76	T
16	.01	.00	.00	.03	.00	.00	.11	T	.26	00	1.20	.00
17	.73	.00	.84	.00	.00	1.15	.05	.00	.01	.00	.00	.97
18	T	.00	.17	.00	.00	.51	.17	T	.00	.00	.00	.00
19	.00	.00	.18	.00	.00	.01	.00	T	.09	.10	.00	.00
20	.81	.78	.00	.00	.26	T	.08	.00	.00	.10	.00	.34
21	.03	.46	.00	.00	.55	.00	.02	.00	.00	.00	.00	T
22	.03	.05	.11	.24	.00	T	.00	.03	.00	.00	T	T
23	.00	.00	T	.04	.62	.00	.00	.00	.00	.00	.00	T
24	.07	.00	.08	T	.04	.10	.87	.15	.00	.00	.00	.00
25	.00	.00	.04	.78	.00	.00	1.06	T	.00	.00	.24	.00
26	.00	T	.00	.00	.00	.00	.90	.00	.00	.00	1.14	.00
27	.14	.00	.00	.00	.00	.01	.00	.00	.00	.00	T	.00
28	.04	.00	.00	.00	.02	T	.00	.00	.00	T	.00	.01
29	.00	....	.00	.51	.00	T	.00	T	.00	.00	T	.06
30	.00	....	.15	.25	.00	.08	.00	.03	.00	.00	.00	.06
31	.00	....	.03	....	.00	....	.03	.00	....	.12	....	.04
Mean	.120	.085	.189	.161	.141	.123	.184	.014	.028	.015	.229	.099

"T" indicates traces of precipitation (less than 0.01 inch).

TABLE IV.

Highest and Lowest Temperature (in Degrees Fahrenheit) at Indianapolis, Indiana, During Each of the Periods 1873–1897, Inclusive. Weather Bureau Observations.

MONTH.	1873.		1874.		1875.		1876.		1877.		1878.		1879.		1880.		1881.		1882.		1883.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
January	60	-13	63	1	44	-18.5	69	9	58	-11	54	-2	57	-22	66	20	47	-6	61.5	7	45	-11
February	63	1	59	17	55	-8	66	-3	63	20	61	18	58	-1	65	14	59	1	65	15	72	4
March	61	2	72	20	77	9	72	11	73	9	72	23	74	15	70	21	62	18	70.5	24	69.4	12
April	81	32	71	27	79	19	77	29	80	28	80	35	82	21	88	27	78	20	80	24	85.3	30.4
May	86	47	89	40	88	34	86	33	88	31	81	35	87	36	85	40	86	44	80.5	37	82.8	35
June	94	62	96	50	91	51	91	51	89	45	91	50	91	47	91	64	92	48	94	45	89	50
July	91	60	97	58	92	63	93	61	90	54	96	58	96	58	93.5	56	101	57	89	53	92	56.8
August	95	51	95	56	87	51.5	89	48	89	57	92	53	93	53	94	51	101	55.5	90	52	91	53
September	87	42	90	41	90	35	88	42	85	42	88	44	80	38	89	41	94.5	48	85	42	87	40.4
October	76	25	78	28	75	28	75	26	83	35	81	23	86	30.5	78	31	80	39	79	35.5	81	35
November	59	13	71	-2	61	14	73	18	61	9	65	25	75	28.5	63	-5	63	10	72	22	65	10
December	62	12	61	12	68	-1	47	-15	67	20	48	-12	64	55	56	-13	63	14	57	-10	62	9

MONTH.	1884.		1885.		1886.		1887.		1888.		1889.		1890.		1891.		1892.		1893.		1894.		1895.		1896.		1897.	
	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
January	56.8	-25	51.7	-11.3	55.3	-15	64.4	-11.8	59.8	-6	58	10	70	4	58	14	54	-5	53	-15	60	-7	58	-12	55	-5	64	-14
February	65.2	1.6	59	-6	54 5	-4.2	66.2	10.5	59 8	-2.1	64	-1	69	14	61	-2	61	11	54	0	66	5	68	-14	70	-5	58	3
March	69.5	5	63.8	3.2	75.9	15.6	69.6	15.8	69	8.8	71	22	64	8	65	8	69	9	75	12	80	12	82	14	68	12	65	24
April	80.5	31.4	78.3	27.8	84	24.5	85	22.4	83.3	30.9	80	23	78	29	84	25	82	27	81	30	86	31	85	31	87	26	81	23
May	84	40.6	87.7	35.3	87.1	39.1	89	49	86 2	36	90	35	87	39	86	36	87	41	88	40	89	35	96	33	92	52	85	34
June	92.8	54.7	90.1	41.1	89	46 9	90	49.4	96.4	45.3	89	41	97	50	94	54	94	56	93	54	96	39	100	54	94	52	91	48
July	90	55.2	94.5	47.5	94.8	50.9	100.8	58.6	94.8	57.5	92	57	97	52	94	52	97	50	97	56	97	54	94	49	96	54	99	55
August	89	50.2	95.1	47.7	92.2	53	99	49.2	97.5	48.9	91	51	96	46	94	50	94	52	95	47	99	50	100	53	98	50	98	50
September	90.3	44.8	83.8	38.4	90.2	43.3	93.1	34	87.9	33.7	90	39	87	40	93	48	88	42	94	38	95	40	94	35	92	37	96	41
October	87	31.2	77.8	31.4	82 3	31.7	82.4	22.3	78.4	32	80	29	84	33	86	31	85	28	84	26	83	33	78	22	78	29	89	37
November	66.8	12.3	69.8	23.7	71.6	16 5	73.5	3.8	76	25.7	67	12	68	27	65	7	62	14	69	8	69	18	73	17	71	10	68	16
December	60.7	12.3	56.8	-2.1	57.7	-3.5	57	3	56	17.4	68	24	52	12	61	20	63	-4	66	6	61	2	62	9	61	12	62	6

TABLE V.

Annual Means for the Years 1872 to 1897, Arranged for Comparative Purposes, as Compiled from the Records of the U. S. Weather Bureau, Department of Agriculture, at Indianapolis, Ind.

YEAR.	Mean Barometer Reduced to Sea Level —Inches.	Mean Temperature—Degrees.	Mean Relative Humidity—Per Cent.	Maximum Temperature During the Year—Degrees.	Minimum Temperature During the Year—Degrees.	Prevailing Direction of Wind.	No. of Clear Days.	No. of Fair Days.	No. of Cloudy Days.	Av. Amount Cloudiness—Scale, 0 to 10.	No. of Days on which 0.01 Inch or More of Precipitation Fell.	Total Amount of Precipitation.	Greatest Precipitation in any Consecutive 24 Hours—Inches.	No. of Days on which the Maximum Temperature was Below Freezing.	No. of Days on which the Minimum Temperature was Below Freezing.	No. of Days on which the Temperature was Above 90 Degrees.
1872	30.044	50.8	67.5	96.0	—11.0	SW	85	142	139	5.0	122	34.07	3.71	49	120	17
1873	30.004	52.0	69.2	95.0	—13.0	SW	97	141	127	5.0	145	52.32	2.73	38	99	9
1874	30.037	65.0	63.0	97.0	— 2.0	NW	97	150	118	5.0	120	43.60	2.61	17	83	27
1875	30.005	50.5	66.1	92.0	—18.5	W	81	138	146	5.0	155	54.58	2.86	44	107	5
1876	29.997	53.2	68.1	93.0	—15.0	W	83	126	157	6.0	155	57.53	2.70	30	101	9
1877	30.008	54.0	67.2	90.0	—11.0	SW	98	141	126	5.0	139	39.08	2.07	20	84	0
1878	29.916	55.4	64.6	96.0	—12.0	SE	84	159	122	6.0	148	38.62	2.03	17	68	13
1879	30.036	53.9	64.4	96.0	—22.0	S	94	135	136	5.0	122	42.88	2.33	27	98	12
1880	30.030	54.4	65.4	94.0	—13.0	W	106	145	115	5.0	123	50.99	2.00	26	19	9
1881	30.024	54.9	67.4	101.0	— 6.0	SW	100	140	125	5.0	112	48.74	4.30	28	91	31
1882	30.045	53.8	71.1	94.0	—10.0	NW	107	141	117	5.3	141	53.68	3.02	19	78	4
1883	30.059	51.8	66.2	92.0	—11.0	SW	98	157	111	5.4	164	54.12	3.71	35	106	6
1884	30.044	52.5	67.6	92.8	—25.0	S	99	144	123	5.6	159	39.99	2.16	40	91	5
1885	30.019	49.3	73.9	95.1	—11.3	SW	92	153	120	5.5	147	39.51	2.87	42	111	15
1886	30.039	51.0	71.3	94.8	—15.0	S	108	150	107	5.2	138	39.88	2.11	47	127	13
1887	30.044	52.7	66.0	100.0	—11.8	S	113	146	106	5.2	119	33.08	1.89	31	120	34
1888	30.052	50.6	68.8	97.5	— 6.0	NW	113	119	134	5.1	124	41.36	2.62	36	103	17
1889	30.062	53.1	69.3	92.0	— 1.0	SW	95	113	157	5.5	113	38.41	2.44	18	71	5
1890	30.066	54.0	68.6	96.9	4.4	SW	77	144	144	6.2	189	54.87	4.41	25	72	23
1891	30.066	53.5	69.0	94.0	— 3.0	Calm NW	113	108	114	5.7	145	38.23	2.86	25	80	25
1892	30.079	52.0	71.0	97.0	— 5.0	NW	95	128	143	5.9	150	39.77	2.73	41	104	16
1893	30.041	52.0	68.0	77.0	—15.0	NW	113	115	137	5.6	144	39.35	1.60	44	114	28
1894	30.069	54.5	67.6	99.0	— 7.0	NW	108	133	124	5.6	127	31.13	2.69	26	83	39
1895	30.076	52.1	67.7	100.0	—14.0	SW	125	124	116	5.2	126	33.54	6.80	46	108	39
1896	30.088	54.1	68.2	98.0	— 6.0	S	102	142	121	5.6	135	39.84	2.34	24	98	25
1897	30.074	53.0	71.4	99.0	—14.0	NW	140	112	113	5.1	137	42.15	3.23	24	98	29

TABLE VI.

Monthly Mean Atmospheric Pressure Reduced to 32° Fahrenheit and the Level of the Sea, for Each Year of the Period 1872 to 1897, Inclusive, as Recorded at the Office of the U. S. Weather Bureau at Indianapolis, Ind.

MONTH.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
January	30.130	30.056	30.120	30.232	30.107	30.160	30.022	30.151	30.026	30.136	30.159	30.162	30.188
February	30.008	30.044	30.099	30.129	30.070	30.156	30.117	30.112	30.049	30.092	30.101	30.253	30.060
March	30.043	30.030	30.041	29.999	29.962	30.013	29.912	30.073	30.059	29.824	30.068	30.057	30.040
April	29.960	29.896	30.016	26.064	29.978	29.898	29.743	29.969	29.946	29.963	30.027	29.965	29.948
May	29.988	29.895	29.940	29.922	29.963	29.992	29.904	29.951	29.974	29.967	29.955	29.940	29.956
June	29.976	29.905	29.925	29.948	29.881	29.907	29.896	29.964	29.947	29.906	29.907	29.931	30.009
July	29.964	29.982	29.954	29.935	29.957	29.931	29.912	29.627	29.957	29.995	30.012	30.012	29.918
August	30.032	30.013	29.952	29.945	30.001	29.926	29.876	29.951	29.976	30.005	29.981	30.050	30.034
September	29.997	30.632	30.020	30.020	29.954	29.997	30.050	30.081	30.033	30.017	30.067	30.048	30.052
October	30.095	30.062	30.093	29.999	29.972	29.983	30.028	30.106	30.062	30.130	30.084	30.090	30.153
November	30.112	30.010	30.116	30.037	29.990	30.038	30.010	30.078	30.207	30.163	30.177	30.161	30.131
December	30.218	30.125	30.165	29.936	30.109	30.097	30.082	30.080	30.124	30.180	30.152	30.136	30.156

MONTH.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
January	30.156	30.063	30.031	30.256	30.056	30.211	30.084	30.146	30.064	30.151	30.065	30.204	30.190
February	30.026	30.114	30.156	30.086	30.174	30.080	30.056	30.109	30.166	30.176	30.210	30.018	30.091
March	30.095	29.975	30.055	30.121	30.004	30.086	30.037	30.084	30.065	30.084	30.068	30.114	30.052
April	30.014	30.029	30.099	30.164	30.018	30.096	30.022	30.090	29.942	30.041	29.999	30.092	30.082
May	29.909	29.925	29.974	29.910	29.974	29.936	30.092	29.945	29.926	29.966	30.056	29.996	30.040
June	30.013	29.951	29.992	29.954	30.012	29.990	29.934	29.950	29.984	30.016	30.054	29.994	29.980
July	29.964	29.963	29.975	30.047	29.968	30.015	30.028	30.078	29.990	30.034	30.022	30.042	29.942
August	29.946	29.982	29.994	30.041	30.098	30.063	30.000	30.022	29.994	30.024	29.972	30.058	30.000
September	30.025	30.084	30.076	30.082	30.054	30.105	30.150	30.118	30.006	31.060	30.073	30.042	30.161
October	29.973	30.198	30.066	30.014	30.153	29.974	30.149	30.106	30.071	30.001	30.130	30.084	30.106
November	30.001	30.051	30.094	30.155	30.102	30.111	30.110	30.133	30.108	30.146	30.160	30.188	30.126
December	30.106	30.169	30.095	30.142	30.184	30.128	30.129	30.167	30.179	30.164	30.080	30.226	30.128

TABLE VII.

Mean Temperature and Total Monthly Precipitation for Each Month of the Period 1872 to 1897, Inclusive. Compiled from the Records of the U. S. Weather Bureau at Indianapolis, Ind.

MONTHLY MEAN TEMPERATURE IN DEGREES, FAHRENHEIT.

MONTH.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Jan	26.6	24.5	35.5	20.0	38.6	27.8	34.5	26.5	45.9	23.7	31.6	24.5	21.6	22.5	21.2	24.4	23.3	34.1	37.4	34.2	23.8	17.9	34.6	22.9	30.0	25.0
Feb	29.6	30.3	35.6	21.2	37.0	39.2	39.0	30.1	38.7	29.8	42.3	32.0	34.7	20.5	28.2	34.6	30.5	27.0	38.8	34.6	36.4	30.0	29.4	21.7	32.4	32.5
March	35.0	37.9	41.6	37.4	37.5	35.5	49.9	42.5	41.6	36.8	44.8	36.1	41.1	33.0	39.4	38.2	35.7	44.4	36.0	35.5	37.4	40.2	47.4	38.8	36.0	42.9
April	55.0	51.2	45.8	49.3	52.0	53.8	85.6	52.3	55.2	47.5	53.3	50.3	50.2	51.5	54.6	52.3	52.6	53.8	53.6	55.4	50.6	52.0	54.0	55.2	60.0	50.8
May	64.3	63.9	66.6	62.3	65.7	61.9	61.6	66.2	68.4	70.2	58.5	60.9	62.1	60.5	64.3	67.3	60.5	61.6	61.6	59.6	60.0	59.9	61.7	63.8	70.8	58.0
June	73.0	76.7	76.2	70.8	71.9	71.5	69.9	71.4	73.3	72.8	71.6	71.5	73.2	68.8	69.2	73.8	72.9	67.8	76.8	74.0	74.6	72.8	74.6	75.6	71.3	70.0
July	77.7	75.3	78.3	75.6	77.7	75.8	79.1	79.5	75.9	79.4	72.6	75.1	73.7	76.3	74.3	80.6	75.2	74.2	75.7	71.9	75.6	79.1	76.4	74.2	75.9	77.0
August	75.9	74.8	75.5	70.2	75.0	73.1	75.2	72.6	75.6	79.0	73.0	70.4	72.3	70.0	72.9	73.3	71.1	71.4	71.1	72.1	74.2	73.4	74.8	76.2	74.7	72.3
Sept	66.7	63.8	68.6	63.1	64.4	66.3	67.0	61.7	64.2	73.5	65.5	63.2	71.6	63.9	66.6	65.8	60.9	64.5	62.9	70.6	67.4	69.0	69.8	70.8	64.2	71.4
Oct	53.3	49.8	55.0	50.8	51.1	58.2	54.0	62.3	52.9	60.2	58.8	54.8	58.3	50.4	55.3	50.2	48.5	50.8	55.0	54.6	56.4	55.7	55.9	49.4	52.2	61.2
Nov	35.3	37.0	42.1	37.9	41.1	42.6	44.9	45.4	31.2	42.8	43.3	45.0	41.5	41.9	39.3	40.5	42.4	40.9	46.5	39.4	38.2	41.0	39.1	42.3	44.6	43.6
Dec	23.8	37.2	35.3	41.2	22.6	46.3	26.9	35.6	24.2	40.2	30.4	34.4	29.9	32.0	25.2	30.8	34.0	46.7	33.1	40.6	30.0	32.8	35.8	34.1	36.1	31.2

TOTAL MONTHLY PRECIPITATION, IN INCHES AND HUNDREDTHS.

Jan	1.17	4.50	3.75	1.01	5.94	1.56	2.38	1.47	6.32	2.10	3.74	1.32	1.05	3.31	4.02	1.48	2.81	2.52	10.20	2.00	1.55	2.77	1.43	3.12	1.60	3.71
Feb.	1.41	2.85	4.17	1.88	4.49	1.21	2.10	2.17	3.16	6.43	7.28	7.19	4.73	1.54	1.51	4.61	2.45	1.29	5.28	5.97	3.53	6.16	4.90	0.86	2.47	2.37
March	1.31	3.90	5.79	5.23	7.44	5.23	1.23	3.36	4.03	4.01	6.11	3.25	3.01	0.82	2.85	2.78	4.26	2.15	4.46	5.77	1.93	2.69	2.82	1.30	3.08	5.85
April	3.26	5.91	4.44	1.29	2.27	3.11	5.51	2.25	6.43	2.60	3.68	2.73	2.89	5.28	3.09	3.92	4.05	2.07	4.58	2.30	6.33	8.60	2.72	1.96	1.27	4.83
May	3.22	3.89	4.03	5.13	5.11	2.09	3.24	3.38	8.22	3.78	7.65	4.02	4.80	3.66	3.82	2.39	4.73	5.76	3.61	1.61	8.83	3.15	4.52	1.07	3.56	4.39
June	3.28	3.70	5.25	12.20	7.54	6.21	2.25	2.91	8.48	3.92	9.35	4.59	4.11	5.74	4.92	2.45	2.65	4.88	4.45	2.90	3.84	3.02	3.76	1.49	3.09	3.70
July	11.00	11.28	3.53	13.12	7.48	4.19	4.54	2.40	2.26	0.82	3.43	6.12	6.03	1.48	2.27	1.41	3.33	5.98	0.97	1.92	2.93	0.83	1.35	2.87	5.72	5.70
August	2.69	1.32	2.90	3.66	5.86	4.13	2.42	5.71	2.67	0.97	4.51	2.48	0.46	5.82	6.70	3.15	5.84	5.51	5.00	5.79	1.39	0.61	1.66	1.91	3.91	0.42
Sept	2.81	1.76	2.09	1.34	3.85	2.04	3.35	6.94	1.86	3.25	0.72	2.72	3.09	3.50	3.43	2.11	1.23	3.79	7.31	0.74	2.42	3.03	1.82	7.46	8.12	0.79
Oct	1.07	5.27	0.36	2.67	4.42	3.32	4.78	1.34	3.54	6.11	2.18	8.56	2.31	3.25	1.20	0.55	4.03	1.70	4.02	1.18	0.28	3.01	2.51	0.83	1.65	0.45
Nov	0.80	2.55	4.82	3.04	2.28	3.64	2.87	5.82	2.58	9.35	2.50	6.80	1.46	2.71	3.87	3.71	5.07	4.97	3.35	5.08	4.90	3.25	1.55	5.81	4.19	6.87
Dec	2.10	5.90	2.79	4.01	0.90	2.45	3.95	5.10	1.44	5.40	2.53	4.34	6.05	2.45	2.20	4.52	1.91	2.76	1.64	2.96	1.84	2.23	2.09	4.86	1.13	3.09

EFFECT OF THE WEATHER ON THE CROPS DURING THE SEASON OF 1897.

Wet weather, sudden changes in temperature, freezing and thawing and insufficient snow-covering during the coldest weather, especially in the southern portion, caused winter crops to suffer much, and, at the end of the winter, wheat, grass and clover were not in very good condition; wheat and grass looked brown and poor, and clover and timothy had been frozen in many fields. Fruit buds, at the end of winter, were apparently safe, except that peach buds in many orchards were killed.

The frequent rains during the month of March did much injury to wheat in low lands, as the rising rivers and creeks overflowed many fields and destroyed the crops, and many wheat fields were plowed again and sown with oats. The wet weather, and consequently the wet soil, retarded farm work, plowing and seeding. At the end of the month wheat was in fair condition in only a few localities.

Cool and wet weather during April continued to retard farm work and growing crops. Wheat and grasses improved only slowly. Oats had not all been sown at the end of the month, and no corn had been planted. Fears were entertained that frost had hurt the fruit, but, with the exception of peaches in localities, all fruit began to bloom at the end of the month.

During May the continued cool weather and frequent showers were unfavorable to growing crops and farm work, plowing and seeding. Frequent frosts, although they did no material injury, checked the growth of crops. But little plowing and corn planting could be done because the ground was not in a favorable condition, and, at the end of the month, everything was belated.

Cool weather predominating during June was unfavorable to young corn, which grew only slowly; frequent rains prevented cultivation, and, at the end of the month, corn was small and backward, but a good stand. Wheat improved rapidly, promising a crop far better than was expected earlier in the season, both in quality and quantity; the crop had ripened rapidly, and the harvest had begun in the southern portion before the end of the month. Oats grew rapidly and promised a good crop. Clover, timothy and meadows grew rank and promised heavy crops, haying having begun before the end of the month. Great crops of rye and barley were in shock. There never was a better pea crop. The strawberry crop was very large, and blackberries and raspberries were very abundant. While apples fell off the trees much, the prospects for a good crop were fair.

Tobacco plants were set out late, but, after being in the field, they advanced steadily. Gardens and field vegetables were in the best condition.

During July the weather continued favorable for crops and farm work. Rain interfered with haying and threshing in localities. All crops grew well during the month; corn, especially, grew most rapidly, and, at the end of the month it was tasseling and shooting, had a fresh, green color and was "laid by" everywhere; but rains began to be needed, especially in the northern portion. Tobacco grew well. Berries were most abundant. The pea crop was very large. Tomatoes and vegetables continued in good condition. At the end of the month wheat was all in shock, and threshing continued; the wheat crop was better than was expected, and good crops of rye and barley were threshed. A good crop of oats was ripening. Immense crops of hay, clover, timothy and grass were secured. Much honey was gathered.

An unusually heavy crop of hay was secured during the earlier part of August, and great crops of berries were picked. Millet and timothy matured nicely, and tobacco grew well. Corn advanced rapidly, the ground still being moist from good rains in July, and it was of good color. But rains were soon needed, especially for corn, potatoes and pasturage. In the middle of the month buckwheat was in bloom, and millet was cut, and, although very dry weather prevailed, all crops matured well, but slowly. At the end of the month corn was beginning to dry rapidly; early-planted corn was in good condition, but that planted late did not ear so well, and some "fired." All crops suffered in localities from want of rain, and pasturage died out rapidly. Much honey was secured by beekeepers during the month. Threshing of wheat, oats and rye continued, yielding heavily. Fall plowing commenced and progressed only slowly, being retarded much by the dry weather.

Warm, dry, sunny weather prevailing during the month of September caused corn to mature and dry rapidly, and, at the end of the month, most of the corn had been cut and put in shock; and all of that remaining standing was safe from frost, and the heavy frosts occurring near the end of the month did harm only to tender vines and plants. Tobacco matured well, and, at the end of the month, nearly all of the crop was safely housed. Beans ripened rapidly, and the continued drouth diminished the bright prospects for a good crop. Tomatoes ripened fast and were picked for the canning factories, and but few late ones were injured by frost. Plowing and winter wheat seeding were delayed, or progressed only slowly, the ground being too hard and dry; some farmers sowed their wheat in dry land, but none of it had germinated near the end of the month. Stock water became scarce in localities, and, pasturage being dried up, stock had to be fed as in winter..

Very dry weather continued during the month of October; light local rains fell only on about four days. The ground remained too dry, and, at the end of the month, wheat seeding was not completed; in a few fields the wheat and rye sown came up fairly well, but, in general, they came up unevenly and looked weak and sickly; much grain sown had not come up at all after being in the ground more than a month; some sprouted and then perished, and some rotted and did not germinate. Frost was late, and a fair crop of tobacco was safely housed before the frosts came; some had been injured by the preceding hot, dry weather. Corn dried out rapidly, and husking and cribbing progressed well; the yield was less than last year; early-planted corn yielded well, but that planted late became "chaffy;" hot, dry weather when earing and just when rain was needed most caused the crop to be lighter, with the quality not so good. Barley and young clover were in fair condition. Turnips, beans and potatoes were poor crops, the latter being small and few in a hill. Pasturage was dry and brown, and stock had to be fed. Stock water was scarce in many localities.

The weather in general during the month of November was very favorable to growing crops. Moderately warm weather prevailed, except at the end of the month, when it was quite cold. Frequent and abundant rains improved pasturage, rye, wheat and all winter crops and put them in fair condition for wintering. Wheat and rye were short, but thick, and of a green, healthy color, and, at the end of the month, all winter crops were much improved, considering how backward and in what poor condition everything had been and suffering from lack of rain until the end of October. Pasturage grew well and was green and fresh. Stock water was plentiful, and stock was in good condition. A fair crop of corn was nearly all cribbed.

In December the weather was favorable to winter crops, and, at the end of the month, wheat, rye and grass were in a favorable condition. Fears were entertained that the rains falling on the 2d and 17th, and freezing soon after touching the ground, had injured wheat in localities, as for several days after the rains had fallen the ground and everything were covered with thick ice. No snow of sufficient depth covered the fields for the protection of the crops at any time, except on the last day of the month; but, fortunately, the lowest temperatures, being only slightly below zero in the northern portion, did not continue long. Live stock was in good condition and wintering well.

ANNUAL SUMMARY, 1897.

The average temparature for the State of Indiana during the year 1897 was 0.7 degrees in excess. The greatest excess, 1.2 degrees, is noted in the southern portion; in the central portion the excess is 0.8 degrees and in the northern portion 0.4 degrees. The average temprature during February, March, July, September, October and November was excessive, especially so in March and October; in the other six months a deficiency occurred.

The average precipitation was excessive. The greatest excess is noted in the southern portion and the least in the northern. An excess in precipitation is noted in the months of January, March, April, June, July and November; in the other six months a deficiency occurred.

Considering the seasons, it appears that the average winter temperature was slightly in excess. The temperatures in December, 1896, and February, 1897, were excessive, and January was a cold month. The precipitation during the winter was deficient; an excess occurred only in January.

The spring was cool. The very excessive average temperature during March was overcome by deficiencies in April and May. The precipitation was excessive, and a deficiency is only noted in May.

The average summer temperature was normal; it was only excessive in July; in some localities it was deficient; at Indianapolis the deficiency reached nearly 3 degrees. The very excessive heat during the first ten days in July and first few days in August was overcome by a great number of days when a deficiency occurred.

The amount of precipitation during June and July was excessive, but the deficiency in August caused the precipitation during the summer to be deficient.

The autumn was very warm throughout, and a great excess is noted in every month, especially in October, when the average excess reached 6.5 degrees. The precipitaton during the autumn was deficient, and an excess occurred only in November.

THE SEASONS OF 1897.

The Year Begins With December, 1896, the Beginning of Winter, and Ends November 30, 1897, the end of Autumn.

MONTHS AND SEASONS.	Temperature, Degrees Fahrenheit.				Precipitation, Inches.			Number of Days.			
	Mean.	Normal.	Departure from Normal.	Monthly Range.	Total.	Normal.	Departure from Normal.	Clear.	Partly Cloudy.	Cloudy.	Rainy.
December, 1896	35.2	33.3	+1.9	77	1.29	2.80	−1.51	10	9	12	5
January, 1897	25.3	26.1	−0.8	76	3.39	2.91	+0.48	8	8	15	11
February	32.7	31.9	+0.8	76	2.92	3.23	−0.31	6	7	15	9
Winter, 1897	31.1	30.4	+0.7	76	7.60	8.94	−1.34	24	24	42	25
March	42.5	38.2	+4.3	73	6.66	3.29	+3.37	8	9	14	13
April	50.7	52.7	−2.0	77	4.33	3.56	+0.77	9	10	11	12
May	58.1	61.8	−3.7	68	3.20	4.16	−0.96	14	9	8	11
Spring, 1897	50.4	50.9	−0.5	73	14.19	11.01	+3.18	31	28	33	36
June	70.6	72.1	−1.5	63	4.31	4.05	+0.26	12	12	6	9
July	76.9	74.8	+2.1	59	3.36	3.13	+0.23	15	10	6	9
August	71.4	72.1	−0.7	62	1.59	2.98	−1.39	16	10	5	5
Summer, 1897	73.0	73.0	0.0	61	9.26	10.16	−0.90	43	32	17	23
September	69.8	67.0	+2.8	79	0.59	3.04	−2.45	25	4	1	2
October	59.7	53.2	+6.5	73	0.90	2.20	−1.30	20	7	4	4
November	42.6	41.1	+1.5	66	6.54	3.92	+2.62	9	8	13	11
Autumn, 1897	57.4	53.8	+3.6	73	8.03	9.16	−1.13	54	19	18	17
Year, 1897	53.0	52.0	+1.0	71	39.08	39.27	−0.19	152	103	110	101

CLIMATOLOGICAL DATA FOR THE YEAR 1897.

STATIONS.	COUNTIES.	Elevation, Feet.	TEMPERATURE (DEGREES FAHRENHEIT.)						PRECIPITATION (INCHES.)							Number Rainy Days.	SKY.			Prevailing Direction of Wind.
			Length of Record, Years.	Annual Mean.	Highest.	Date.	Lowest.	Date.	Length of Record, Years.	Total for the Year.	Greatest Monthly.	Month.	Least Monthly.	Month.	Total Snowfall.		Number Clear Days.	Number Partly Cloudy Days.	Number Cloudy Days.	
SOUTHERN.																				
Boonville	Warrick	416	1	......	......	......	......	......	1	......	......	......	......	......	......	......	......	......	......	......
Bright	Dearborn	.....	2	53.9	98	Sept. 15	—12	Jan. 25	2	46.65	9.50	Mch.	0.64	Aug.	25.3	127	160	97	108	sw
Butlerville	Jennings	......	13	53.9	99	Sept. 15	— 9	Jan. 26*	13	54.10	13.03	Mch.	1.06	Sept.	23.2	122	181	74	110	†w
Columbus	Bartholomew	632	14	52.6	98	Sept. 15*	—11	Jan. 25*	14	46.02	9 48	Mch.	0.66	Aug.	16.8	108	156	79	130	sw
Edwardsville‡	Floyd	......	4	57.3	96	Sept. 15*	— 6	Jan. 26	4	42.94	8.09	Mch.	0.47	Aug.	11.1	104	168	108	89	w
Evansville	Vanderburgh	386	3	56.4	100	Aug. 3	— 1	Jan. 27*	3	52.73	10.96	Mch.	0 43	Aug.	......	114	189	46	130	sw
Greensburg‖	Decatur	954	2	......	......	......	—11	Jan. 26*	2	......	8.86	Mch.	0.37	Sept.	......	......	......	......	......	......
Jasper	Dubois	450	5	56.3	100	Sept. 16*	— 4	Jan. 28	5	47.03	9.50	Mch.	0.53	Aug.	7.3	77	134	67	164	......
Jeffersonville‖	Clark	455	8	......	98	Aug. 4*	— 2	Jan. 26	8	46.72	8.55	Mch.	0.41	Sept.	4.5	122	145	120	100	nw
Madison‖	Jefferson	460	5	......	98	July 4	— 5	Jan 25	5	......	8.09	Mch.	0.26	Sept.	10.0	......	......	......	......	sw
Marengo	Crawford	363	16	55.9	100	Sept. 15*	— 5	Jan. 28	16	48 24	9.19	Mch.	0.45	Sept.	14.9	99	......	......	...	sw
Mt. Vernon	Posey	410	9	......	100	Sept. 15*	— 2	Jan. 28	9	44.37	8.43	Mch.	0.57	Aug.	......	99	201	38	126	nw
Princeton‡‖	Gibson	481	15	......	101	Aug. 3	— 4	Jan. 28	15	41.96	7.75	Mch.	0.25	Sept.	15.7	......	......	......	......	sw
Rockport‖	Spencer	......	1	......	......	......	......	......	1	......	......	......	......	......	......	......	......	......	......	......
Salem‡‖	Washington	716	1	......	102	Aug. 3*	— 8	Jan. 27	1	43.91	7.82	Mch.	0.62	Sept.	13.5	93	......	......	......	w
Scottsburg	Scott	570	4	55.8	99	Aug. 3*	— 6	Jan. 25	4	46.37	8.01	Mch.	0.16	Sept.	9.5	82	159	94	112	w
Seymour‖	Jackson	610	10	......	99	July 9	— 8	Jan. 25	10	......	12.95	Mch.	......	......	......	......	......	......	......	......
Vevay‖	Switzerland	525	33	......	......	......	— 7	Jan. 26*	33	......	8.90	Mch.	......	......	12.0	......	......	......	......	sw
Vincennes‖	Knox	431	4	......	103	Sept. 13	— 3	Jan. 29*	4	......	13.22	Mch.	0.44	Oct.	6.0	......	......	......	......	......
Washington‖	Daviess	484	3	......	102	Sept. 13	— 4	Jan. 26*	3	47.90	9.72	Mch.	0.59	Sept.	......	114	107	68	100	......
Worthington	Greene	540	16	54.6	100	Aug. 3	— 7	Jan. 26	16	47.43	9.59	Mch.	0.58	Sept.	22.8	106	125	155	85	†sw
Mean	......	......	14	55.4	103	Sept. 13	—12	Jan. 25	14	46.95	13.22	Mch.	0.16	Sept.	14.9	102	168	79	118	sw

CLIMATOLOGICAL DATA—Continued.

STATIONS.	COUNTIES.	Temperature (Degrees Fahrenheit.)							Precipitation (Inches.)							Number Rainy Days.	Sky.			Prevailing Direction of Wind.
		Elevation, Feet.	Length of Record, Years.	Annual Mean.	Highest.	Date.	Lowest.	Date.	Length of Record, Years.	Total for the Year.	Greatest Monthly.	Month.	Least Monthly.	Month.	Total Snowfall.		Number Clear Days.	Number Partly Cloudy Days.	Number Cloudy Days.	
CENTRAL.																				
Anderson	Madison	892	3	52.0	99	July 8, 9	—18	Jan. 25	3	45.48	7.47	Nov.	0.39	Oct.	24.7	121	96	185	84	†w
Bloomington	Monroe	744	2	54.0	100	July 9	— 7	Jan. 25	2	47.43	10.63	Mch.	0.59	Aug.	20.5	84	173	46	146	nw
Cambridge City	Wayne	......	6	51.2	99	July 9	—15	Jan. 25	6	44.96	8.70	Nov.	0.39	Oct.	22.6	128	152	95	118	nw
Connersville	Fayette	844	16	51.1	98	July 3, 8	—14	Jan. 25	16	43.58	9.15	Nov.	0.71	Sept.	20.7	108	107	171	87	sw
Crawfordsville‖	Montgomery	......	1	......	......	......	......	......	1	......	......	......	......	......	......	......	......	......	......	......
Farmland	Randolph	1101	14	51.0	96	July 4, 9	—13	Jan. 25*	14	37.12	7.70	Nov.	0.65	Sept.	38.5	100	105	86	174	......
Franklin‡	Johnson	740	15	......	......	......	—10	Jan. 25	15	......	9.46	Nov.	......	......	27.7	......	......	......	......	......
Greencastle	Putnam	860	3	52.4	94	Aug. 3*	—14	Jan. 25	3	42.20	6.93	Nov.	0.54	Sept.	24.0	135	163	52	150	......
INDIANAPOLIS	Marion	823	26	53.0	99	July 9	—14	Jan. 25	26	42.15	6.87	Nov.	0.42	Aug.	36.2	130	143	106	116	nw
Knightstown‖	Henry	......	2	......	99	July 9	—15	Jan. 26	2	43.21	7.93	Nov.	0.40	Oct.	39.1	122	138	110	117	sw
Mauzy	Rush	......	17	51.6	96	July 8, 9*	—15	Jan. 25	17	45.86	9.25	Nov.	0.80	Sept.	32.7	126	174	100	91	w
Northfield	Boone	......	2	50.8	97	July 9	—16	Jan. 26*	2	38.30	7.17	Nov.	0.20	Sept.	29.0	108	125	127	113	nw
Richmond	Wayne	972	2	51.9	98	July 4	—14	Jan. 30	2	42.55	8.23	Nov.	0.90	Sept.	14.5	104	100	173	92	......
Rockville	Parke	722	11	52.4	98	Sept. 12	—15	Jan. 25	11	38.28	6.10	Nov.	0.13	Sept.	20.0	109	......	......	......	......
Shelbyville‖	Shelby	774	1	......	102	July 5	—10	Jan. 26*	1	......	9.84	Nov.	1.30	Sept.	......	......	......	......	......	......
Terre Haute	Vigo	496	5	54.8	99	Aug. 2*	—10	Jan. 26*	5	41.19	7.10	Nov.	0.30	Sept.	10.8	98	154	65	146	s
Tipton‖	Tipton	860	2	......	100	July 8, 9	—18	Jan. 25	2	......	......	......	0.05	Sept.	......	......	......	......	......	......
Mean	......	...	14	52.4	102	July 5	18	Jan. 25	14	41.56	10.63	Mch.	0.05	Sept.	26.3	109	144	105	116	sw nw

NORTHERN.																						
Angola‡	Steuben	1052	12	50.2	103	July	9	—20	Jan.	25	12	34.97	5.60	Nov.	0.45	Sept.	43.6	92	107	95	163	nw
Auburn‖	Dekalb	874	2	......	100	July	11*	—19	Jan.	26	2	29 03	4.22	Nov.	0.71	Sept	.....		......	......	......	......
Bluffton	Wells	835	3	50.7	103	July	9	—21	Jan.	26*	3	40.39	5.91	May	0.64	Oct.	37.0	128	185	78	102	w
Columbia City‡	Whitley	841	13	49.5	98	July	9	—20	Jan.	25	13	34.08	4.51	Mch.	1.06	Oct	30.1	80	150	88	127	......
Delphi	Carroll	66*	13	50.7	102	July	8, 9	—18	Jan.	25	13	34.19	5.64	Nov.	0.25	Sept.	20.2	109	104	114	147	......
Ft. Wayne‖	Allen	775	1	......	100	July	9	......	......		1	......	......	......	......	......	......	......	......	......	......	sw
Hammond	Lake	......	4	48.9	99	July	8	—20	Jan.	24	4	37.79	4.98	June	0.23	Oct.	80.0	94	100	167	98	......
Huntington	Huntington	741	4	50.2	100	July	9	—18	Jan.	24	4	38.89	5.68	Nov.	0.93	Sept.	48.5	125	188	81	96	nw
Knox‖	Starke	......	1	......	99	July	8	......	......		1	......	......	......	......	......	......	......	......	......	......	......
Kokomo	Howard	840	6	52.2	104	July	8	—16	Jan.	25	6	38.26	6.76	June	1.05	July	26.4	113	99	160	106	nw
Lafayette	Tippecanoe	661	18	51 6	99	July	8	—22	Jan.	26	28	33.34	5.49	Nov.	0.05	Sept.	22.1	124	164	85	116	w
Laporte	Laporte	......	1	......	102	July	8	......	......		1	......	......	......	......	......	......	......	......	......	......	......
Logansport	Cass	620	15	50.3	102	July	8	—18	Jan.	25*	15	28.33	5.75	Nov	0.28	Sept.	22.0	114	77	152	136	......
Marion	Grant	814	11	51.4	101	July	8	—20	Jan.	25	11	37.35	5.91	Nov.	0.56	Sept.	29.2	128	97	158	110	sw
Markle	Huntington	......	1	......	......	......		......	......		1	......	......	......	......	......	......	......	......	......	......	......
South Bend	St. Joseph	726	4	49.8	101	July	8	—22	Jan.	25	4	32.39	5.53	Jan.	0.28	Sept.	66.5	134	102	175	88	sw
Syracuse‡	Kosciusko	864	2	......	......	......		—20	Jan.	26*	2	36.27	5.26	Nov.	0.20	Sept.	39.0	111	176	54	135	w
Topeka	Lagrange	......	2	.....	97	July	9	—18	Jan.	25	2	29.60	5.23	Nov.	0.14	Sept.	23.3	83	142	143	80	nw
Valparaiso	Porter	737	5	49 6	98	Sept.	13	—21	Jan.	25	5	......	5.97	Jan.	T.	Sept.	25 8	57	139	120	106	nw
Warsaw	Kosciusko	826	2	50.1	98	Sept.	24*	—20	Jan.	25	2	32.91	5.58	Nov.	0.19	Sept.	.....	101	210	85	70	w
Winamac	Pulaski	......	1	......	100	Sept.	13	......	......		1	......	......	......	......	......	......	......	......	......	......	......
Mean	......	......	14	50.1	104	July	8	—22	Jan.	25	14	33.68	14.98	June	T.	Sept.	33.4	105	138	117	110	sw
State	......	......	16	52.7	104	July	8	—22	Jan.	25	16	40.44	14.98	June	T.	Sept.	24.3	116	148	102	115	sw

T. in precipitation column indicates amount less than 0.01 inch. *On other dates also. †Other directions also. ‡Temperature data from thermometers not self-registering. ‖Incomplete record.

C. F. R. WAPPENHANS, Section Director, Indianapolis, Ind.

UNION MEETING

OF

Farmers' Mutual Insurance Companies.

Held at Indianapolis, January 6, 1898.

CONSTITUTION AND BY-LAWS.

Annual Amounts Saved by Farmers' Mutuals, $40,000.

OFFICERS:

Aaron Jones, President, South Bend.
Geo. V. Kell, Vice-President, Huntertown.
Joshua Strange, Secretary, Arcana.
J. L. Thomas, Treasurer, Pendleton.

A CIRCULAR.

The Farmers' Mutual Fire Insurance Union of Indiana.

Organized January 29, 1897.

Aaron Jones, President,
South Bend.
Joshua Strange, Secretary,
Arcana.

Geo. V. Kell, Vice-President,
Huntertown.
J. L. Thomas, Treasurer,
Pendleton.

To the Fire Mutual Insurance Companies of Indiana:

Gentlemen—The growing popularity of mutual insurance in our State on account of its economic methods is a matter of first consideration to the farmers of the State as a practical method of cheap and reliable insur-

ance. It so forcibly recommended itself to those of long experience in it that a call was sent out, signed by the Governor and others, for a meeting to be held at the agricultural rooms in the State House, January 29, 1897, and asking each company in the State to be present by delegate for the purpose of organizing a State Union and the unifying of our best methods of insurance, have annual reports from each company, a compilation of these reports to be published with the proceedings of the annual meetings. Also, the Secretary of the State Board of Agriculture agrees to place them in the Agricultural Reports of Indiana.

With all these features of advantage presenting themselves the representatives of twenty-six companies formed an organization under the caption of "The Farmers' Mutual Fire Insurance Union of Indiana."

The report of the meeting, constitution and by-laws, and a compilation report of each Mutual Insurance Company in the State will be printed, and copies will be furnished to all reporting to the Secretary, giving the date of their oganization, amount of insurance in force, assessments and losses, your form and laws, and, in fact, all the information that you are in possession of.

We urge upon you the importance of becoming a member of the State Union at once. The membership fee is placed at three dollars for each company and the annual dues one dollar, to be sent to the Treasurer, J. L. Thomas, Pendleton, Ind.

AARON JONES, President,
South Bend, Ind.

JOSHUA STRANGE, Secretary,
Arcana, Ind.

CONSTITUTION AND BY-LAWS

OF THE

FARMERS' MUTUAL FIRE INSURANCE COMPANIES' UNION

OF INDIANA.

Article 1. This association shall be known as the Farmers' Mutual Fire Insurance Companies' Union of Indiana.

Art. 2. The membership of this association shall be composed of the various Farmers' Mutual Fire Insurance Companies organized in the State of Indiana, who, by their directors, shall voluntarily unite with this association, and pay to the Treasurer the membership fee of three dollars and annual dues of one dollar.

Art. 3. The voting members shall be the delegates sent by the various companies. Each company shall be entitled to one delegate and one additional delegate for each $1,000,000 or fraction over $500,000 of insurance in force on that company's books. Any member of a Farmers' Mutual Fire Insurance Company may take part in the annual meetings, but is not entitled to vote unless a duly authorized delegate.

Art. 4. The officers of this association shall be a President, Vice-President, Secretary and Treasurer, who shall hold their offices for one year and until their successors are elected and qualified.

Art. 5. The fee for membership in this association shall be $3 and the annual dues shall be $1.

Art. 6. The objects of this association shall be to gather information relative to mutual insurance, to promote the interests of mutual insurance companies by formulating the best forms of applications, polices and adjustment blanks for the settlement of losses, best form of bookkeeping and best method of collecting assessments, and by a mutual comparison of news and experiences advance the interests of insurance; to issue annually circular letters; to lessen the number of fires by advising precautionary measures, and thus lessen the cost of insurance.

Art. 7. The annual meetings shall be held at the Agricultural rooms in the State House on Thursday following the first Monday in January of each year. commencing at 10 o'clock a. m.

PROVISION FOR AMENDING.

Art. 8. This constitution can be extended or amended at any regular meeting of this company by a two-thirds vote of the members present, provided a written notice of such intention shall have been given at a previous annual meeting.

BY-LAWS.

Article I, Section 1. The officers of this association shall be elected at the annual meeting by ballot, a majority of all the ballots cast being necessary for an election.

Sec. 2. The officers of the association shall perform the work required of them by the annual meeting at such compensation as shall be allowed by the annual meeting.

REPORTS OF INSURANCE COMPANIES.

1. Jefferson County Farmers' Mutual Insurance Company. Amount in force, $1,172,420. D. P. Monroe, President and Delegate.
2. Kokomo Mutual Insurance Company, composed of Cass, Howard and Tipton Counties. Amount in force, fire, $528,611; tornado, $942,661. Jacob L. Smith, President. L. E. Collier, Secretary and Delegate.
3. Tipton County Farmers' Mutual Insurance Company. Amount in force, $500,500. Hiram Heath, President and Delegate. Wm. Wiggins, Actuary.
4. Hamilton County Farmers' Mutual Insurance Company. Amount in force, $2,037,332. W. C. Gray, Actuary and Delegate. J. E. Driver and G. W. Young, Delegates.
5. Decatur County Farmers' Mutual Insurance Company. Amount in force, $1,500,000. M. E. Beter, Delegate.
6. Madison County Farmers' Mutual Insurance Company. Amount in force, $1,775,000. B. F. Ham, Joseph Sanders, J. L. Thomas, Delegates.
7. Jennings County Farmers' Mutual Insurance Company. Amount in force, $383,540. G. M. Crist, President and Delegate. E. N. Morris, Secretary.
8. Tri-County Farmers' Mutual Insurance Company, composed of Delaware, Randolph and Henry counties. Amount in force, $1,000,270. L. J. Hook, President and Delegate. J. Q. Helman, Secretary.
9. Gibson, Warrick and Vanderburgh counties, Farmers' Mutual Insurance Company. Amount in force, $1,736,877. J. P. Morris, President. Jno. H. Heldt, Secretary and Delegate.
10. Shelby and Johnson Counties Farmers' Mutual Insurance Company. Amount in force, ———. B. S. Sutton, President. W. R. Clore, Secretary and Delegate.

11. Elkhart County Farmers' Mutual Insurance Company. Amount in force, $4,427,900. D. J. Whitehead, President. S. A. Hoover, Secretary and Delegate.
12. Lawrence Township, Marion County, Farmers' Mutual Insurance Company. Amount in force, $235,662. J. W. Apple, Delegate.
13. Warrick, Vanderburgh and Gibson Counties Farmers' Mutual Insurance Company. Amount in force, $1,600,00. W. R. Norcross, President and Delegate. Alvin S. Hines, Secretary and Delegate.
14. Lawrence County Farmers' Mutual Insurance Company. Amount in force, $1,000,000. H. Henderson, Secretary and Delegate.
15. Hendricks County Farmers' Mutual Insurance Company. Amount in force, $3,012,091. Geo. W. Scearce, President and Delegate. Simon Hadley, Secretary.
16. Boone County Farmers' Mutual Insurance Company. Amount in force, $600,000. W. G. Vandever, President. R. F. Ashley, Secretary and Delegate.
17. Green County Farmers' Mutual Insurance Company. Amount in force, ———. Hosey Jones, President. John Berns, Secretary and Delegate.
18. Benton, White and Jasper Counties Farmers' Mutual Insurance Company. Amount in force, $280,000. J. H. Riddle, President.
19. Farmers' Mutual Insurance Company of West Newton. Amount in force, $302,000. I. J. Burnet, President. David Horner, Secretary.
20. German Baptist Tri-County Mutual Protective Association of Wayne, Union and Fayette Counties. Amount in force, $712,500. D. O. Dilling, Secretary.
21. St. Joseph County Farmers' Mutual Fire Insurance Company. Amount in force, $2,746,970. Aaron Jones, Secretary.
22. Montgomery and Fountain Counties Farmers' Mutual Insurance Company. Amount in force, $3,500,000. J. A. Mount, Delegate.
23. Grant County Farmers' Mutual Insurance Company. Amount of policies in force, $220,000. I. M. Miller, President. Joshua Strange, Delegate.

ADDRESS.

Governor James A. Mount appeared before the meeting, and in his address he earnestly urged every Farmers' Mutual Insurance Company to join in the State Union now being formed for the purpose of promoting the interests of mutual insurance companies in the State, and by a comparison of methods and experience and by issuing annually a report of the cost and the causes of fires and urging the adoption of such careful rules as will reduce the number of fires to the minimum, will be a means of great saving to the people of the State in the cost of their insurance. And he further quoted an extract from his inaugural address, January 11. 1897, as fully covering his views on mutual fire insurance.

From the inaugural address of Governor Mount January 11, 1897:

"Too great a sum of money is leaving our State in premiums for the amount returned in loss on policies. Recent examinations of the State Auditor's books show that since 1873 there has been paid out over $53,000,000, while there has been paid back to policy holders but little over $28,000,000. These reports indicate a loss to policy holders of $25,000,000. It matters but little whether this immense sum of twenty-five millions of dollars was in profits or in extravagant salaries, the loss to our people and the State is too excessive.

"The organization of home companies should be encouraged. The present excessive rates of insurance are driving the farmers into the organization of home mutual companies, as provided by the acts of 1881. Millions of dollars' worth of farm property is thus being insured at low cost, with the money kept at home."

This is a brief extract from the report of the Farmers' Mutual Insurance Union of Indiana that will be published in pamphlet form.

AARON JONES, President,
South Bend, Ind.

JOSHUA STRANGE, Secretary,
Arcana, Ind.

Indiana State Poultry Association.

The eighteenth annual exhibition of this Association was held December 13 to 18, 1897, at Tomlinson Hall, Indianapolis, Ind. The Board of Directors had previously decided that this exhibition should be devoted to poultry exclusively, with the result that upwards of a thousand specimens of thoroughbred fowls of the highest quality were embodied in the exhibition. The premiums consisted of regular cash prizes offered by the society, and many valuable specials given by individuals. The awards were placed by I. N. Barker, of Thorntown, Ind., and James A. Tucker, of Concord, Mich. The exhibitors from adjoining States were greatly in evidence. The exhibit was a success in numbers and quality, but was a detriment to the Association financially. An elegant and extensive exhibition of artificial incubation was given by the Prairie State Incubator Company, demonstrating the practicability of artificial methods of hatching and rearing poultry. On the evening of Thursday, December 16, the annual meeting of the Association was held in the rooms of the State Board of Agriculture at the Capitol. In addition to the regular business interesting addresses were made by prominent breeders from abroad.

MINUTES OF MEETING.

Meeting called to order by President Conger.

Minutes of meeting of September 16, 1897, read and accepted.

Nominations made for members of the Board of Directors for ensuing year; fifteen nominations made.

Moved and passed that the seven nominees receiving the highest number of votes constitute the Board of Directors.

Elected and installed as directors for the year 1898: B. F. Hill, N. J. Hyde, W. L. Hagedon, Thomas W. Pottage, of Indianapolis, Ind.; Ed. B. Murphy, of Carmel, Ind.; R. M. Gard, of Frankfort, Ind.; Frank P. Johnson, of Carmel, Ind.

Moved and passed that next annual exhibition be held at Indianapolis, Ind., during the week of the meeting of the Agricultural Societies in the month of January, 1899.

Motion made and carried to instruct the President and Secretary to ascertain the exact dates for the meetings of the Indiana State Legislature and Board of Agriculture.

Moved and carried to re-engage Mr. James A. Tucker, of Concord. Mich., to act as judge for exhibition of 1899 on same terms as 1898.

Moved and carried to engage the services of Mr. B. N. Pierce, of Indianapolis, Ind., as one of the judges for 1899.

Moved and carried to instruct the Secretary to correspond with judges selected and secure their services.

Moved and carried that the President secure Tomlinson Hall for dates specified in these minutes.

Moved and carried that a special day during the exhibition week be set apart and designated as Indianapolis Day.

Moved and carried that Thursday of exhibition week be designated as Indianapolis Day and that same shall be advertised.

Moved and carried that the Chair appoint a committee to meet with the Indiana State Legislature to secure an appropriation in behalf of the Indiana State Poultry Association for 1899.

Committee appointed by Chair, consisting of Messrs. Hill, Hyde. Gard, Hagedon, Conger, Johnson, Bennett, Murphy and Pottage.

Moved and carried that the Secretary be instructed to correspond with the proper parties and obtain a copy of the rules, regulations and proceedings pertaining to the granting of appropriations by the legislative bodies of the States of Illinois and Nebraska.

Adjournment till Thursday, September ——, 1898.

On adjournment of regular session a meeting of the newly elected Board of Directors was held for the purpose of electing officers for 1899.

Mr. N. J. Hyde appointed chairman.

Meeting called to order.

The following members were appointed to serve for 1899: President, N. J. Hyde, Indianapolis, Ind.; Secretary, Thomas W. Pottage, Indianapolis, Ind.; Treasurer, B. F. Hill, Indianapolis, Ind.

The sixteenth annual meeting of the Indiana Jersey Cattle Club was held on the evening of June twelfth (12th) at the office of the Jersey Bulletin, the Vice-President (May Harmon) in the chair, with the following members present: May Harmon, J. N. Knox, Mortimer Levering, T. P. Hessong, Peter Raab, D. H. Jenkins, J. E. Robbins, D. P. Shawhan, M. L. Hessong, Harry Jenkins, Lewis Moore, A. V. Bradrick, S. O. Dungan and W. S. Budd. The minutes of the preceding meeting were read and approved. The Secretary made the following report:

Amount of cash received for dues	$45 00
Amount of cash fees for membership	6 00
Banquet tickets	20 00
Total	$71 00

Received of W. S. Budd, Secretary, the sum of $71.00.

G. V. WOOLEN, Treasurer.

Approved and ordered inserted upon the minutes.

The Treasurer being absent, the Secretary made his report:

Balance on hand at last report		$45 65
Received of Secretary		71 00
Total		$116 65
Amount paid out—		
To Joseph Ratti, for printing	$3 50	
Grand Hotel	45 50	
Joseph Ratti	6 50	
Secretary's expense	9 25	
		$64 75
Balance on hand		$51 90

Approved and ordered spread upon the minutes.

The election of officers for the following year resulted as follows: President, J. E. Robbins, of Greensburg; Vice-President, D. H. Jenkins, Indianapolis; Secretary, W. S. Budd, Indianapolis; Treasurer, Dr. G. V. Woolen, Indianapolis.

Directors to serve for two years: Mortimer Levering, of Lafayette; A. V. Bradrick, Connersville; M. L. Hessong, Alliance.

On motion, Mr. J. C. Hood, of Lowell, Mass., was made an honorary member.

By motion, it was agreed to appoint a committee of three (by the Chair) to revise the Constitution and By-Laws and to send each member of the Club a copy of the revised edition, asking for their opinion of same before the next meeting, the same committee to take up the matter of delinquent dues.

The Chair appointed the following committee: Mortimer Levering, Lewis Moore, A. V. Bradrick.

The Board of Directors was requested to meet after the adjournment of this meeting to make arrangements regarding the Secretary's stipend.

It was moved that the name of Mortimer Levering be recommended to the American Jersey Cattle Club as a member of the Board of Directors from Indiana.

W. S. BUDD, Secretary.

Indiana State Veterinary Association.

The Indiana State Veterinary Association held its annual meeting in the State House January 5, 1898. Twenty-six members were in attendance.

The following were elected officers for the ensuing year: President, F. A. Balser, New Castle; Vice-President, L. A. Greiner, Indianapolis; Secretary, J. C. Rodger, Anderson; Treasurer, O. L. Borr, Muncie.

The Association transacted its regular business and after the discussion of a number of cases the following papers were read: "Municipal Milk and Meat Inspection," and "Electricity in the Treatment of Azoturia."

MUNICIPAL MILK AND MEAT INSPECTION.

BY DR. T. B. PETE, MILK AND MEAT INSPECTOR, TERRE HAUTE.

The examination of our food or parts of it is a work which has been carried on for ages, and the importance of it has been more and more appreciated as we have grown older as a people, and, indeed, the necessity for it has become more emphatic as we have advanced in civilization.

The origin of it goes back to a very early date, as we note the meat inspection laws enacted by the early Jews, apparently based on Mosaic law, and we have reasons to believe some sort of food inspection began with the birth of commercial transactions, for it was then that adulteration began, and it is evident that some manner of control originated very soon after.

Very ancient writers speak of food examinations, and history has carried down to us a few of their processes, but at present they are of no value, except as historical curiosities.

Not until the enlightenment brought about by advancements in physiology and chemistry has the subject progressed along the proper lines of thought.

Of sanitary science it has been said that "from the earliest ages much of the noblest thought, the deepest study, the most sympathetic and earnest endeavors have been designed either directly or indirectly to gain or improve the health of man." So it is with this department of sanitary science meat and milk inspection and from ancient man to the present day the necessity of food inspection has been recognized.

The necessity for this line of work is now more fully appreciated than ever before, and much valuable work will probably be done in the next few years.

The question of municipal milk supplies is one of paramount importance, as will be readily seen when we note the enormous quantity of milk consumed in cities.

It is estimated that each person in a city consumes on an average a half pint per day. Estimating a city with a population of 40,000 inhabitants, we see that more than 2,500 gallons are consumed daily—more than fifty barrels—nearly a million gallons annually. And yet this is a small amount to be consumed when we consider that it is one of the best and cheapest foods, because it contains all of the constituents necessary for the nourishment of the body and for the young it is the only food provided by nature in a form suitable for easy and perfect digestion.

On the other hand, milk is found to be almost as perfectly adapted as a food and medium for the lower forms of life, being a product subject to rapid changes and variations in its composition: a very unstable fluid, containing no bacteria if drawn from a perfectly healthy cow into a sterilized vessel, but coming in contact with the atmosphere it soon gains micro-organisms numbering into the thousands per CC.

Milk is the only animal food that is consumed to any extent in the raw state, and so its purity from a sanitary point becomes all the more important.

Milk is also, as before mentioned, a splendid fluid medium for bacteria, such as the bacilli of tuberculosis, diphtheria, scarlet fever and typhoid fever, and it is when containing these that the dangers are so momentous.

It is estimated that of a city's mortality about 50 per cent. of it is of children under five years of age. Among the causes of this premature mortality, bad milk, or milk poisoned with disease, is reckoned as among the first causes.

To-day a large number of infants are bottle-fed, and the proportion is increasing, which points conclusively to the necessity of more care in the production and care of milk.

Almost all sorts of bacteria may find in milk a good medium for their development, some of which are germs which transmit disease from animal to animal and from animal to man, while others may be present which produce chemical changes in the fluid, rendering it toxic to the delicate child or invalid.

The susceptibility of the cow to tuberculosis and the transmissibility of the tubercle bacilli to man through the medium of milk and meat marks the importance of this work.

Recalling the fact of a city's mortality, 50 per cent. of which is estimated to be children under five years of age, and that most of these come about as a result of intestinal derangements, the question arises, is not this intestinal derangement more often due to milk poisons, and probably often, too, to milk containing the bacilli of tuberculosis, which infects the intestinal glands.

Tuberculosis in dairy cattle is on the increase and wherever systematic inspection is being carried out it is found that the per cent. of herds affected is alarmingly high, herds having been found where from 40 to 90 per cent. of its members were diseased, and even in our own State herds have been found of which 75 per cent. of their numbers were tuberculous.

Tuberculosis in the human family is a disease which pervades all ranks of society, from the mansion of the rich to the cottage of the poor, destroying more than 150,000 lives annually in the United States, and 2,060 in Indiana in 1896, while only 1,902 died from combined effects of contagious and infectious diseases so dreaded and so carefully guarded against.

Returns of deaths in 1896 from contagious and infectious diseases show as follows in Indiana:

Diphtheria	717
Scarlet fever	96
Measles	34
Smallpox	0
Erysipelas	63
Whooping cough	0
Cholera	0
Cerebro spinal fever	12
Typhoid	980
Total	1,902

The necessity for dairy inspection does not stop with tuberculosis, for other diseases develop among dairy cattle, and defects in sanitary conditions surrounding them may be numerous, such as ill-ventilation, ill-drained stables, impure water and feed—all go to make up those qualities which impair the milk supply of a city.

The necessity of investigating the condition of health of the dairyman's family becomes an important feature in dairy inspection relative to tuberculosis in his family or any one who may be working with milk; also typhoid fever; one little typhoid bacillus gaining admittance to the milk develops rapidly and is sufficient to impregnate a whole can, rapidly conveying the disease to an entire village or neighborhood.

Diphtheria and scarlet fever bear much the same danger relative to milk as other diseases mentioned, and danger lies in the milk coming from all such infected districts.

In meats that we consume many derangements and diseases are now directly traceable to the impure flesh. Tuberculosis, here again, plays a most important part, and the seriousness of the matter justifies a most critical examination of all meats which are consumed as human food.

The high temperature required for the destruction of the bacilli of tuberculosis is not always reached in cooking of meats, and so we remain open to the danger of infection.

Trichina in pork is one of the dangers to be met; cholera, also, while not known to produce any particular disease in the consumer of the meat, is far from being wholesome and should be condemned unreservedly.

Other diseases and affections of lesser importance, but all going to make up possible dangers from our food suply, or to be a detriment to it in making it unwholesome, are mentionable, but what have been enumerated are those of most importance, and will suffice.

"The public health and the welfare and safety of a people are of paramount importance, to which all the pursuits, occupations and employments of individuals inconsistent with their preservation must yield."

Nothing is so costly in all ways as disease, and nothing is so remunerative as that outlay which augments health, and in so doing augments the amount and value of the work done. Every dollar wisely spent for the preservation of public health is returned tenfold, sometimes a hundredfold to the community.

Some have said that it is impossible with any reasonable outlay to inspect all meat sold in a city, and so with the milk supply, and so it is with a few hundred dollars, but thousands should be devoted to this work that man might reach nearer his biblical three score and ten with a healthful body and mind.

The successful plan of carrying out such work must be somewhat on the plan adopted by the Bureau of Animal Industry, with the plan modified to adapt itself to the city according to its size.

The most important matter must be concentration of the slaughtering of all animals intended for food purposes to one place, and the entire destruction of all private slaughtering establishments and prohibition of any private slaughtering only at public abattoirs, where space could be rented to those who wished to carry on their own slaughtering or that it could be done barely at the cost of maintaining the abattoir institution.

Such slaughtering to be done there under supervision of the inspector, who would inspect animals before and after slaughter, and the meat leaving there to bear his tag and official seal, so that the consumers would be assured of its healthfulness.

This will be the ultimate plan for meat inspection, and the task of replacing the private slaughtering houses by public abattoirs can only be carried out by degrees, but the public will demand in the future that such shall be done.

In a city of 40,000 inhabitants no doubt such concentration of all slaughtering to one place would enable a municipal inspection of all meats consumed by the city at a very reasonable cost.

Meat and milk inspection, which includes dairy inspection—the most important of them all—should be under one head inspector under the control of the Board of Health. They are closely related, and the examination of a carcass of meat may be the means of detecting a diseased dairy herd. With dairy inspection should go that rigid inspection of all dairies supplying milk to the city, such inspection to be made at frequent intervals in such a way that the condition of a dairy herd, its sanitary surroundings and the character of feed used, the quality of water, etc., with the health of the dairyman's family could be reached on short notice. The milk inspection can only be carried out properly when conducted on a basis of knowing the exact conditions that surround the production of milk, who it comes from, etc.

In Massachusetts the deaths from consumption have fallen in the past ten years from 31.6 to 22.7 per thousand persons.

In Massachusetts the State Board of Agriculture has adopted a comprehensive scheme of purifying the herd of cattle by the adoption of the tuberculin test.

In 1894, 39,000 were examined and later 3,295 were tested, with the result that 810 were diseased.

While it is not intended to imply that from meat and milk consumption finds its only source, yet it is to be understood that this is one of the important factors, commanding the utmost attention.

It can not be ignored further that consumption, tuberculosis of animals, is communicable from animal to animal and from animal to man, and the seriousness of the matter demands that strong measures should be adopted in the prevention of the disease which causes one death out of every 7, or 14 per cent. of all deaths.

To meet this serious question is the proper move of all municipalities, States and the whole country, and part of this work is the purifying of dairy herds of this disease, and it seems that the best thing at hand is the tuberculin test, which s being generally used and adopted by Boards of Health and Cattle Commissioners of the several States.

It has had its opponents, who are gradually giving up their opposition and acknowledging that their failures with it were due to their own mistakes and not the tuberculin.

Among some of the reasons of the objections has been that tuberculosis was conveyed by its use, but when we remember that in its manufacture it is subject to a temperature of 230 degrees Fahr. and to a subsequent evaporation at 205 degrees Fahr. and then placed in sterilized bottles and securely sealed the impossibility of it conveying disease is realized.

Again, it is claimed that reaction does not follow its administration on diseased cattle. Thoroughly tried on this point, it seems that in some cases it will not react in exaggerated conditions, but in such cases the judgment of the operator should come to the rescue, and it is usually no trouble to diagnose such cases.

Tuberculin will occasionally react on cows which are apparently in a healthy condition, and post mortem may not show the tubercular lesion, but it is the opinion of authorities that it is there and, indeed, in such cases, after examining for hours, a tubercular nodule has been found.

Finally it has been asserted that an injecteion has given the coup de grace to a diseased animal, which has nothing to condemn it.

Of the number now which have been subjected to the test, which number into the thousands, the failures of the test to indicate the disease is indeed small and insignificant compared with the seriousness of the disease.

In closing, it is with pleasure and pride that we can note the advancements that are being made in the improvements of the sanitary conditions of the surroundings of the producers of milk and meat and the recognition of the veterinary profession in this line of work by the medical profession, and the intelligent citizen should encourage the members of our profession in the advancement in this important field of research, so noble in its aim, so broad in its scope of usefulness, and its benefits unlimited.

Even one object of this work has for its aim to only aid in the prevention of one disease which has destroyed human life for ages, and destroys more lives than any other cause—more lives sacrificed upon its altar than the combined results of the contagious and infectious.

Yet, it is a preventable disease, but owing to its slow and insidious progress the seriousness of it has not always been fully realized.

But it would seem now that it is coming up for a serious consideration and we may hope for the future that the powers may take such steps in the way of legislation as will result in the checking of this disease.

And the time is coming, as will be seen by the following utterance of Mr. Nathan Strauss, of New York, before the Mayors' Convention at Columbus, O., in September last, in which he said: "There is practically no milk delivered for general consumption in cities that is fit to be fed in its natural state to young children. I think I have demonstrated the proposition that many thousands of infant lives are annually sacrificed by neglect to supply for nutriment of children milk which has been sterilized. I hold that neglect criminal, and I leave it to you to fix the responsibility for it. We punish murder with the penalty of death, and yet we allow murder to be committed by the wholesale in every populous community of this land with no thought of its punishment and little thought of its prevention. You have the means under your control by which these babies can be saved. I ask you—Will you not apply them? Men are found capable of acts of heroism in presence of danger less threatening and less surely fatal. All that I plead for is the extension of the activity of local boards of health into a sphere which is legitimately theirs, but which they have so far lacked the conviction and courage to occupy."

ELECTRICITY IN THE TREATMENT OF AZOTURIA.

BY DR G. G. FERLING, RICHMOND.

Azoturia (haemoglobulemia) is a dietetic disease or plethoric condition of the blood system due to high feeding and standing in the stable without proper exercise. The blood becomes charged with albumen, and when the horse is taken out and exercised or put to work the excess of albumen is oxidized and changed into various compounds, as excess of urea and hippuric acid, causing spasm and contraction, especially in the lumbar region and the loins, thus causing partial loss of motive power. I have seen some cases where the muscles of the elbow region were also affected.

Symptoms.—The horse is taken from the barn feeling well and playful and will go a half a mile or more and suddenly becomes sluggish, sweats violently, in fact, he may look as though he had taken a swim in a river. bows up his back, goes lame, knucles at the hind fetlock joints, staggers and nearly falls down, and when stopped he breathes very heavy. The pulse becomes accelerated, the legs are cold, he becomes restless, paws. and wants to lie down. In some cases he falls down and tries to get up. If he succeeds in getting upon his feet it will be with great difficulty. More often he attempts to rise and fails, and may remain down then for a number of days. In other cases they do not get down, but after standing for a few minutes they become so stiff that they are unable to walk. The stiffness becomes most marked in the hind limbs, and it is not uncommon for the owner to think that his horse is stifled. He may hold up one foot as though it had been pricked with a nail. After a time the horse tries and does urinate, the urine being of a dark-red coffee color, containing an excess of urea and albumen. A test of the urine is to allow some of it to stand in a glass and a sediment will form in the bottom. Add a few drops of nitric acid and nitrate of urea will be precipitated.

Azoturia is often mistaken for inflammation of the kidneys and was quite common last spring. This was probably due to the late season, the farmers were feeding plenty of corn and expecting to go to work nearly every day. It is not as frequent in an open winter where horses are turned out more or less of the time. The prognosis is according to the severity of the case.

Treatment.—A light case, when the horse is able to stand and able to walk, should be taken to the nearest stable at once. Tie up his head so that he can not lie down. and if necessary have partially supported with blankets for a short time. In a little while he will be able to stand without assistance. Give him a stimulant and diuretic of some kind, which is generally all that is needed. Others that get down and are unable to rise I put upon a sled and take to a roomy box stall and plenty of straw. Fill some sacks with straw or sawdust, putting them around the edges so that he will not bruise himself. Give a stimulant and diuretic, cover the patient well with blankets and after a short time give a physic of oil of aloes. In the course of a few hours the animal may be offered some drink and food. In some cases I use the catheter to withdraw the urine.

In other cases, after being down for twenty-four hours, I begin using electrical treatment, which consists of an induction coil, battery and suitable electrodes, sponges and plates. The loins and hips are dampened with warm water and apply the brass plate to the back and have it held by an assistant. I take the sponge and apply it over the parts affected for about twenty minutes. This is repeated two or three times a day. I begin with a weak current and increase it as I deem necessary. Some horses can stand more than others. I generally use it until the muscles quiver as the sponge is passed over them. After going over one side thoroughly the plate is changed to the other and the operation repeated. Sometimes after the horse is able to stand, the muscles in the region of the stifle, those supplied with the crural nerves are atrophied. I then apply a very strong current a few times each day. As a rule the horse will urinate freely after the use of the current. I have had good results from this treatment.

A horse that has had one attack of azoturia is subject to another and should not be left idle in the barn, but should be turned out to exercise. He should never be fed heavy when not in use.

MEETING

OF THE

Indiana Wool Growers' Association,

January 4-5, 1898.

Meeting called to order by President T. C. Phelps, 2 p. m., January 4.

Reading of the minutes of last meeting by the Secretary, Mr. Robe. Moved that the minutes be adopted by the Association as read. Seconded and adopted.

Reading of the Treasurer's report by Secretary; adopted as read.

Moved and adopted that the stenographer be employed for $8 and favored.

President Phelps: It has been our custom at this stage of the meeting to offer to any wool-grower present who may wish to become a member the opportunity, and would be glad to have you all become members with us. I suggest that any one who wises to become a member come forward and become a member of one of the best Associations in Indiana.

Mr. Duncan: I move that they make an assessment of 25 cents on the old members; motion seconded.

Mr. Calvin: I move to amend Mr. Duncan's motion and make it 50 cents in order that there may be sufficient means in the treasury to accomplish something. Moved and seconded that the Association be assessed. Carried.

Mr. Howland is asked to come forward and take the chair.

Address by Mr. T. C. Phelps, President.

ADDRESS OF PRESIDENT PHELPS.

It seems to be the duty of the President of every association or society not only to review the conduct or the business for the past but also to make some forecasts for the success in the future. The sheep and wool industry has not been so profitable the last year as we would like to see it. but it has been quite an improvement on the previous year. Although we have had times of depression, has not the sheep industry been as profitable as any other line on the farm? The raiser of sheep in Indiana, especially mutton sheep, as a rule makes less complaint of depression in prices than any other person engaged in general farming or stock raising. Prices at times have been very low and discouraging, but there has not been a time when a well-cared-for flock would not yield wool enough to pay for its keeping, thus leaving the lambs as clear profit, with the additional profit of fattening the ewes and selling them at a fair advance on their cost. Indiana is not what is termed a wool-growing State, but it is a sheep-raising State. There is a common tendency to look upon flock culture as mainly a business of wool-growing; in fact, the State organization of sheep owners in Indiana calls itself a wool growers' association, thus impliedly ignoring the fact that sheep are good for some other purpose than producing wool. The effect of this tendency has been to divert attention from the sheep as a factor in meat production, and this in face of the fact that a pound of mutton can be produced as economically and sold for as much money as can be had for a pound of either beef or pork.

Restricting estimates of profit from sheep to the quantity and selling value of wool is seriously misleading, inasmuch as it excludes a very important factor from the calculation, and this fact must be kept in mind when laying the foundation of a flock. So it seems to me that we are doing business under the wrong name; it should be a sheep breeders' association or sheep raisers' society, instead of Wool Growers' Association. But as to the future; there has been no time in the history of our Association when we had a better right to be encouraged than right now. Although there are not so many sheep in the country as a year ago, the wholesale slaughter going on during the last few years has been checked, the doubt and uncertainty of the passage of a tariff measure is now over, and we have a tariff bill, although not entirely satisfactory to all, but in the main I believe most wool growers are satisfied. In the last year fresh activity has arisen in the business situation, and with it a demand for more sheep. Farmers are buying sheep that have never before kept them; more mutton is being consumed every year; so, as I said before, if there ever was a time when we had good cause to be encouraged and hold up our heads it is right now.

Mr. Darnell: Mr. Chairman, I have heard the President's address and move that it be referred to a committee of three to be reported upon tomorrow morning. So referred.

TREASURER'S REPORT OF THE INDIANA WOOL GROWERS' ASSOCIATION.

January 4, 1898.

Balance on hand at last meeting		$5 81
Received at the January meeting		9 00
Total		$14 81
Disbursements (shorthand report)	$8 00	
Secretary, bill posting, etc	3 81	
Total		11 81
Cash on hand		$3 00

Respectfully submitted,
JOHN L. THOMPSON,
Treasurer.

WHAT IS THE WOOL MARKET DEMANDING AT THE PRESENT TIME?

BY MR. H. H. KEIM, LADOGA.

The world is full of the commonplace; what the market is demanding at the present time is wool, not dirty wool, not chaff wool, not hair (unless it is sold for hair), but wool such as every member knows. The demand is strong for all kinds of wool that is produced in Indiana; the demand is strong for the excellent grades; the demand is strong for all the mediums, including the fleeces of the Southdowns, Shropshires, Cotswolds, and all other breeds that produce similar kinds of wool. The demand is especially strong in competing with the best used. In competing with the foreign wools, all classed as combing wools, there is a bigger jump in prices from the prices of last year or two in merino wools on account of the present tariff bill than in any other class or wool. The protection will be greater to the breeders of wools in that class of wool, and the only class of wool that will be hard to sell will be the short, frouzy stuff that is bred on poor sheep, but all first-class wools will find ready sale in Indiana if put in marketable shape. The very best is always taking premium, and the manufacturers are looking for good, clean qualities of wool and will pay a good price for it.

Now, it is said frequently we do not have room for special breeds of sheep. Now, I am not a crank on certain breeds of sheep. There is a demand for all kinds of wool that can be produced.

We can not grow good wool in a day; you can not let sheep rough it and then have a strong, lustrous wool. Wool-growing is a study. If we produce wool that is of fine quality, as much as can be grown on sheep, as little waste, as little frouzy as possible, as free of hair and as soft as possible, we can demand a good price for it. A man can be delighted with his production if he has something good. I want to ask every one to care the very best for our sheep and when they come under the shears the wool should be free from dirt and packed in good shape that we are not ashamed to sell. We have room in Indiana for all kinds of sheep, and whoever says "I have the only thing there is; if you want a good sheep get the kind I have," that man is ready for the asylum. In England they have all kinds of sheep. Indiana is a great big State and it is not full of sheep yet. A farmer has some hogs, they lay down and die; he wishes he had some sheep. He did not know anything about sheep; he did not want sheep; his father never had any; he don't want them. If he never had any, how does he know? The man who studies his business and makes a nice, clean work of all he does, and tries to have something extraordinary, will have profit, and it is only the wool that comes from the shiftless farmer who lets his sheep run wild, letting them get full of weeds, burrs and trash, who moves them to the barn and says, "I have brought you the stuff," who gets mad if he does not get the price.

I wish that we had sheep enough that all the people might wear woolen clothing if they wished. I wish that in this country we had five sheep for every one of our people, and I look forward to the time when we shall have two million billions of people and a sheep for every one. Then we shall have prosperity. We would have meat to eat and clothes to wear, and we would have money with which to buy the necessaries of life.

Mr. Roundtree: Being a new member of this Association, I just wish to say that the demand of the market to-day is for better wool. It is not for the amount of mutton that he grows, but it should be the demand of the market. What it was ten years ago it is not to-day, and as wool-growers we ought to meet the demand of the market to-day. It is of the wool-combing order. We have a great many good breeds, but they have come up out of experimental breeding, but what the demand is to-day is what we should endeavor to meet. I want to say that I have bred this wool for two years and that I sold 1,200 pounds of it, and also received $50 premium. This wool is to-day the wool that is in demand. It is the combed wool and I would be pleased to submit it to you.

J. Herkless: There is one point in the gentleman's remarks I wish to ask about. My motto is to select what I think is the best. These fashions change so quickly that you can not change your breed every time, as you will thereby lose all your profit. Now, my idea is to select a profitable breed of sheep and breed straight along.

Mr. C. B. Howland: It is very hard to get the kind of wool that is the most marketable and the sheep that is the most profitable for mutton. The point I would make is this: Can we come to an understanding as to which is the best sheep for the profitable sale of wool and also for the profitable sale of the carcass?

Mr. Duncan: I believe it has been proven beyond contradiction that all varieties of wool are salable, and I think the quality of all of these different varieties depend upon the proper keeping of the sheep. The different combing wools and the different varieties of the short wool, if they are taken from a fat carcass, sell at a good price at any time, and it should come with force to every wool-grower that the important think in wool-growing is keeping the sheep properly, and it is one that should be followed carefully.

J. E. McDonald: The men who make the most money in our part of the country are Jews who never raised sheep in their lives. They bring the wool to Ligonier, they sort it in bales, good, medium and carpet grades, and refuse, and many other grades, and they sell that wool from the market price they pay you on the street up to 35 cents a pound. They sort it in a way that when a buyer comes in for carpet wool they have a car load of carpet wool, and if they want combing wool they have it in car loads. They handle nearly five million pounds of wool and bale it as Indiana and Michigan wool. "Indiana Wool," especially, is on the letter-head of the individuals who deal in this wool, and I think this is the point you should inquire into—this sorting and handling, so that you can get the very best price. But if you have some poor fleece you are bound to get the worst of it in the deal.

Mr. Calvin: I have been a little puzzled to know exactly what this question means. Now, if it simply means as it reads, "What is the wool market demanding at the present time?" I entirely concur with the gentleman who opened this discussion; it is like all markets and demands the best. If it means what kind of wool, meaning all the time and keeping in mind all the time the best, then that is another question. All men that go to the market for the purpose of buying an article, whether it be corn, wheat, horses or cattle, they want the best. If the question that was intended to be discussed was "What kind of wool is the most profitable for the wool-grower to grow?" then I think you will find as many notions in regard to that as there are different kinds of wool produced in the country. Now, this kind of wool (merino wool) will bring a little more money per pound than perhaps another kind that goes into our market at the present time, but there is another kind that will bring more per fleece because there are always more pounds with proper keeping than there is in that. Now, I never quarrel with a man as to the kind of sheep he shall keep,. but I say, keep sheep because they are profitable in more ways than one.

I believe that I have tried every kind of sheep that is common to our country except the Dorset, and I am satisfied from my long experience that a large, smooth Merino is the most profitable sheep to keep, especially if the farmer keeps any quantity of them. They are hearty, they yield a big fleece, they are a good mutton sheep and they will live nearly twice as long as the other sheep that grow that kind of wool. If you will keep several hundred of sheep in a flock together, I feel confident you will find that you will need a pretty good mixture of Merino blood to keep them in good condition. Every farmer should keep sheep. They are profitable in many ways, not only in the wool they produce, or in the mutton they produce, but you can take an ordinary farm of one hundred and sixty acres and put one hundred and fifty sheep upon it and they are always worth the wages of a hand in the way of keeping down filth, weeds and alders that would otherwise have to be kept down in a more expensive way.

The American people use more wool than any other people on the face of the earth. We are only about 5 per cent. of the entire population of the world, and at the same time we are using 25 per cent. of the wool that is grown. Why should we not grow it for ourselves? When I first looked at this question I thought it perhaps meant, "Was it necessary to have a better price for wool?" but on rereading it I decided differently. While we have a degree of protection in our industry it is in most respects very similar to what was known as the McKinley law. You remember that wool declined a little lower every year until we were paying 32 per cent. tariff on wool that was bringing us but 13 cents per pound, and there was no other reason for it but that there were loopholes in that law. I believe that during the last year the McKinley law was in force there were a hundred million pounds of wool passed the custom house. Twenty-eight million pounds were Chinese wool, and that passed the custom house as carpet wool when it was shown by the best statistics of the country that more than 42 per cent. of it was woven into cloth. We have a similar point in the present law, but perhaps it is not right that I should discuss the question at this time. I will say, though, that there was 78 per cent. of the wool during 1891, 1892, 1893 and 1894 that passed the custom houses in the United States as third-class wool at that nominal duty.

Mr. Keim: I will recapitulate very briefly a few items I should have mentioned before. One is in regard to fashion: What is the market demanding? It is demanding the best. It is said "the rays of light have become intense; woe to him who stops to tie a shoestring." If you are breeding Merino sheep, stick to them; they are good wool-growers.

Mr. Roundtree: Brother Conger and Brother Keim have breeds of sheep that we are using. In my remarks I did not refer to any particular breeds, and in presenting the samples of wool to this Convention I claim to produce wool in Indiana as good as can be produced in the world.

These wools are of six different kinds of breed. I am breeding just as good sheep as the best of them. I wish to produce the wools that bring the best price in the market.

METHODS OF A BREEDING ASSOCIATION.

BY MR. MORTIMER LEVERING, LAFAYETTE.

Mr. President, by the subject, "Methods of a Breeding Association," I think the President means the records of a breeding association. I will consult the committee on this. My idea of this was that the men wished to have me say a few words in regard to a recording and registry association, not so much the methods of a breeding association. The methods of some breeding associations will not bear daylight, but all record associations will bear the closest scrutiny. What I expect to say will be of the organization and conduct of a record association, its object and ultimate results.

The first thing necessary before organizing an association, if we hope to have success, is to organize to register a certain kind of sheep that have some particular merit and have this association of men come together to improve that in its particular line to justify that particular characteristic. In this country they are forming new kinds of sheep. There is great advantage in registering stock of any kind. The men who are engaged in it will expect to get the best examples and most typical animals of the kind and are willing to pay for the animal that combines the most features that they think best. The record association will first appoint a committee of men who will be able judges. The men should be unbiased, they should be conservative and should only take those animals that can reflect credit on the variety. Next, they want most excellence in characteristics. Ordinarily, judges at local fairs pay little attention to points of excellence that belong to different associations. If you should judge Hampshire sheep, they give most points on quarter because they lack most in quarter. Take the Southdown sheep; nearly every judge judges on the line of quarter. I speak of this here because it is important that we elect men qualified as judges and take up each of this association and judge in the rendering accordingly. In regard to the matter of fees: Some men recommend very low fees. Some Merino associations have recorded them by flocks at 10 cents per head, and yet they have not had high prices for their animals. There is a gentleman present to-day who is about to purchase a ram. He said he would like to submit the pedigree of this ram to us, for "it is good enough to put at the head of my flock." You must have a family that is founded and based on good history. Any man that has one or two or three families that is named has no difficulty in selling one of the families named. It is said here to-day by some that a good cross of sheep will do. Well, I believe that the members of the Indiana Wool Growers' Association are not very much for grades, and I quite coincide with Brother Keim's statement that we should breed them pure. Have nothing but registered sheep and record the merits of the families. The success of a breeding association, or, rather, record association, is very largely due to the class of members that compose it, men who are aggressive and who are willing to come to fairs and make an exhibition of their stock and have animals that are in good show condition and suitable for farmers. The breeding associations to-day are each pushing forward to make a market for the sheep grown by breeds. The leading breeds are having good demand for sheep this year. I believe that the highest-priced wool is controlled by attention to the demand for certain kinds of goods and that this makes the highest-priced wool. The highest priced wool known to-day is Cates. a wool that is little grown in this country, and if a man has not land that is adapted for growing a certain kind of wool he had better get a grade of sheep that will do best on his soil. The markets change somewhat each year as fashions in goods change. There are a great many things to be considered. I want to say along in the line of record associations that when men are found to be tricky they should be dealt with accordingly. Men should be required to deliver the goods as they are represented. Whenever a man is found to make false statements in the pedigree of his animals, or any other statement that is not true, he should be dealt with by the association.

The United States Government has imposed some conditions on imported sheep that are very objectionable to our foreign cousins, particularly so in Canada. This act was passed in 1892 and was formulated by the horse-breeders. This act required that the sires should be registered. that the sire's sire should be registered, and the dam, and so on for three generations on each side. We have tried to have this modified, but it has been impossible. The sheep that are grown in England: The ewes are recorded only in flocks, but the rams are recorded, but no flock of ewes can be recorded except by a committee. A statement is made as to what particular ram was used on that flock in that season, but it is impossible in this country for a committee to visit every flock, so it becomes necessary to register it individually. The points of excellence in the different breeds are changed somewhat each year, and a sheep that would have passed into the standard five years ago could not be passed to-day, and he could not bring cents to-day where the modern sheep would bring dollars.

Mr. Konkle: What kind of sheep should not be raised in this country?

Mr. Levering: One would be the small merinos and the other the Persian or fat-tailed sheep. Investigating the stock yards as I have in the past month, it is astonishing the sheep that have been brought to these markets. It is a wonder that the American people eat any of the sheep that come into the market. They are the meanest, nastiest little brutes I ever saw. They are not fit for mutton, wool or guano. We want something that will put weight and muscle and meat on its back for the amount it eats. A small Merino sheep has to fight flies so much that it has no time to fatten. They move in such close flocks that they ruin the pasture. We should get rid of these great bands of poor sheep. In Montana we drove through bands of sheep and a friend of mine would occasionally lift one into the buggy that would not weigh 35 pounds.

Mr. Duncan: Why do so many inferior animals get into these records? We are speaking about methods in this Breeder's Association, and that is what we wish to learn. What are your methods?

Mr. Levering: If the record fees were $2 a piece, a man would not record a sheep that he would not get $2 for, but he would sell it to the butcher.

RAPE FOR SHEEP PASTURE IN INDIANA.

BY MR. MARION WILLIAMS, MUNCIE.

I hardly know why the Committee on the Program put me on this subject, and I feel my incompetency. I have grown rape on a small scale for ten years, and I am going to tell you how we kept 300 sheep in 1896 without any grass, on plenty of water and fresh air, but before I get that far—we sowed 25 acres of rye in 1895, and we kept the sheep off of this rye until March and then turned them on to the rye; and the 12th of March we sowed clover, and I want to say that we had one of the finest stands of clover we ever had. The sheep were taken off about the 10th of June, and the clover would have made excellent hay. The other half of the field the sheep ran on until the first of June. About half the rye was eaten, but the rye was too ripe, so we mowed this rye for hay. We could have mowed an extra good crop of clover again, but as we did not care to take it off the year of the sowing, we let it go down for mulch.

Now, how we kept the sheep on water and fresh air: We simply let them have this rye, and we commenced about the first week of April to sow two acres and kept sowing two acres until the last of May, and at the last time we plowed 16 acres for corn we sowed the corn, so you see we had quite a good patch of rape on the first two acres. We cut it and carried it into the barn, the remainder was hurdled off, and turned the sheep into it, and we kept on these two acres about 50 head of sheep. One drawback about it was that I was away for two or three days in August, just when the heavy rains came. Six or seven acres of this rape looked as if hot water had been poured on it. We turned the sheep on to this rape. It did not last long; it was rotten at the stem. There were two acres we mowed about the 10th of July, and this rape was very fair pasture the 10th of December. The first two acres we sowed broadcast; the remainder was sown with the drill; we took our common corn drill, making the rows 16 inches apart and three pounds to the acre. The second day after we sowed it the rain beat that down; the sun came out and only about one-third came up; so, after it got to be a couple of inches high, I went in with a 62-inch harrow. This rape the heat and water did not seem to effect so much. This field we put into oats last spring, and you could see all summer to the very line where that rape had been pastured off. The oats made over 51 bushels to the acre, so I do not know whether it was the rape that helped that along or whether it was a good year for the oats. I aimed to have a 16-acre piece of land for feeding lambs. I turned on 100 lambs after the corn was husked out, but while we were keeping the sheep on water some of them would get too much rape and consequently would bloat, and we had considerable loss. It is a very good idea that while you are growing a little rape, you should grow a little clover. We did not need any hay, so we cut the corn. We got pasture from the same land, resting up our old pastures, thus having good pastures for early spring; you have your fall pastures for rape, and you can care for it with very little trouble. We must practice a three-year rotation of crops. We sow the rye for the spring pastures and the rape for fall.

Mr. Privitt: Keep the sheep off when there is dew and they will not bloat.

Mr. Cowgill: I have been in the habit of sowing rape for the past six years, and I am satisfied that I have never sowed anything that has been so profitable to me as rape. I speak with reference to fall pastures. It requires pretty good ground to receive the rape, and it should be well pulverized. I sow from the 10th to the 20th of June, and I never fail to have a good crop.

Sheep fatten and grow very fast upon it. I have never experienced any particular difficulties about bloating.

Mr. Conger: I want to ask Mr. Williams if he does not think it is just about as safe to sow rye.

Mr. Williams: The trouble is in getting the rye pasture sowed early enough. Now there is very little trouble with lambs bloating on rape, but the old ewes eat so ravishly that they bloat very much.

WHAT IS THE SPECIAL INFLUENCE OF FOOD ON THE CARCASS?

BY PROF. C. S. PLUMB, PURDUE UNIVERSITY.

On the basis of many chemical examinations and feeding experiments, foods may be divided into two great groups or classes, viz., muscle or lean meat-producing and fat-producing. Those foods which promote the production of muscle or lean meat, we term nitrogenous or protein foods, while those which produce fat in the carcass, we term carbonaceous foods. If the foods which we have are taken to pieces by the chemist, he will find that they contain three kinds of substances:

1. Protein.
2. Carbo-hydrates.
3. Fat.

The protein encourages the production of flesh, while the carbohydrates and fat encourage fat production.

Foods differ in the amount of these substances they may contain. Ordinary corn may contain only nine pounds of protein in every 100 pounds of meal, while gluten meal may contain three times as much protein as does the corn meal. One hundred pounds of rye straw contains only about three pounds of protein. while red clover contains over ten pounds. The chemist tells us that every 100 pounds of common field cured corn fodder contains only four and one-half pounds of protein. while 100 pounds of cow-pea hay contains over 16 pounds of protein.

Having secured a knowledge of the composition of foods, the chemist began to feed them to animals, for two purposes: First, to learn of the digestibility of the food and second to learn of its influence on the animal carcass. These investigations made it appear that of every 100 pounds of a given food, 85 or 90 or some other amount, as the case might be, would be digested and stored up in the system. Then it was shown that so many pounds each of protein, carbohydrates and fat, in the total 100 pounds, would be digested. This class of experiments with animals also made it evident in some cases that where a food rich in protein was fed, it would tend to the production of lean meat in the carcass, while if the other class of food was fed, the tendency would be toward fat production. Professors Sanborn and Henry first attracted much attention to this subject in America, through feeding pigs for lean and fat meat, and their experiments showed in a clear manner that where pigs were fed highly carbonaceous foods, their carcasses contained much less lean meat than when they were fed a ration containing a strong per cent. of protein.

The results of these experiments led to the feeding of other kinds of farm animals on different forms of foods to note the influence of these on the carcass. Some of this work has been conducted on sheep, and to this I wish to direct your attention.

At the Cornell University agricultural experiment station, 18 grade Shropshire lambs about eight months old were divided into two lots of nine each. One lot was given a food rich in protein, while the other was given one highly carbonaceous. Lot one was fed hay, corn, oats, roots and water, and lot two hay, bran, linseed meal, cotton seed meal, roots and water. Lot one was a carbonaceous ration and lot two a nitrogenous ration. All the sheep were fed three months. During this time lot one, receiving carbonaceous food, made an average gain per head of 22½ pounds, while lot two, receiving food rich in protein, made an average gain of 24½ pounds each. The total gain of lot one was 202 pounds, and of lot two 245½ pounds. The gain of lot two, receiving nitrogenous food, was more uniform than that of the other lot. These lambs also drank more than twice as much water as did the ones fed carbonaceous food.

Another experiment along this same line was conducted in 1888-89 at Cornell. Four lots of grade Shropshire lambs were fed of three in a lot. Lot one was fed a carbonaceous ration of timothy hay, whole corn and roots; lot two a nitrogenous ration of clover hay, two parts wheat bran and one part cotton seed meal; lot three an intermediate ration of timothy hay, roots and grain, consisting of three parts corn and one part each of wheat, bran and cotton seed meal. Lot four received the same as three, excepting that no roots were fed. In this experiment lot one ate 29.00 pounds of protein; lot two, 75.88 pounds; lot three, 54.71 pounds, and lot four, 51.73 pounds. In this experiment the lambs receiving nitrogenous food, or lot four, made by far the largest gain, while those fed carbonaceous food, lot four made the smallest, lot four making a gain of 38.66 pounds and lot three 24.38 pounds. The corn fed lot consumed more nutrients (6.67 pounds) for each pound of gain than any other, while the protein fed lot ate the smallest (4.71 pounds) amount of nutrients for each pound of gain. Says Robert and Wing, "It cost us a little more than a cent and a half per pound, or 26 per cent. more to put a pound of gain upon our lambs that were fed on corn, timothy hay and roots than it did to put a pound of gain on those that were fed wheat bran, cotton seed meal, clover hay and roots." It is interesting to note that those fed the nitrogenous food drank much more water than those receiving the carbonaceous ration, and they also give a much heavier yield of wool than the corn fed lot. In fact, these experimenters conclude that the production of wool is very greatly dependent upon the protein in the ration.

At the Wisconsin experiment station some work in this field has been carried on for a number of years. In 1890 two lots of sheep were placed in a feeding experiment, one of which received a carbonaceous ration of shelled corn, cut corn fodder and corn silage, while the other was fed a nitrogenous ration of oats and oil meal mixed equally by weight, clover hay and clover silage.

There were six Shropshire grade wethers in each lot and the sheep weighed in the neighborhood of 85 pounds each when the experiment began. The experiment lasted 12 weeks, ending the middle of April. The results of this experiment are shown as follows:

Lot I. Fed Shelled Corn, Corn Silage and Corn Fodder.

Cost of 703 pounds corn eaten at 71 cents per 100	$4 99
Cost of 409.7 pounds corn silage at 10 cents per 100	40
Cost of 655.5 pounds corn fodder at 20 cents per 100	1 31
Cost of 181 pounds gain in live weight, including wool	6 70
Cost of 100 pounds gain in live weight, including wool	3 70

Lot II. Fed Oats, Oil Meal, Clover Silage and Clover Hay.

Cost of 418 pounds oats at 88 cents per 100	$3 67
Cost of 418 pounds oil meal at $1 per 100	4 18
Cost of 1,738.5 pounds clover silage at 10 cents per 100	1 75
Cost of 569.5 pounds clover hay at 40 cents per 100	2 27
Cost of 214 pounds gain in live weight, including wool	11 85
Cost of 100 pounds gain in live weight, including wool	5 53
Cost per pound of gain in Lot I	3.7 cents
Cost per pound of gain in Lot II	5.5 cents

This experiment shows that the corn fed lot increased in live weight at a rate of $1.80 cheaper per 100 pounds gain than did the other lot. In an experiment conducted the previous year, the sheep fed a carbonaceous ration made not only the cheaper gain, but also somewhat the largest.

The ration rich in protein gave rather the best results in wool crop.

The wethers were slaughtered, and a study made of the carcasses, but "there was no uniformity in the differences in the lots in regard to the mixture of fat and lean in the carcasses."

At the Storr's Experiment Station in Connecticut, 12 grade Shropshire wethers, averaging about 72 pounds each, were divided into two lots. One was selected from each lot and slaughtered and the carcass analyzed. The others were sheared and placed in a feeding experiment for 84 days, ending March 29. Lot one was fed hay, turnips and corn meal, and lot two hay, linseed meal, pea meal, wheat bran and corn meal. During the 84 days, the animals fed carbonaceous food made an average gain of 23 pounds, while the protein fed lot gained 26½ pounds.

Analyses were made of the different animals after slaughtering at the end of the experiment, when it was found that the edible portion of the flesh of the carbonaceous fed lot contained slightly less protein and a trifle more fat than did the flesh of the protein fed lot.

This same kind of an experiment was continued another year at the Storrs' station, and while there was some increased gain by feeding the protein ration, the experiment produced no very definite results.

In feeding experiments on 80 Shropshire grade lambs at the Minnesota station, those receiving cracked corn, a carbonaceous ration, gained 211 pounds, while those fed cracked corn and linseed meal gained 289 pounds. The linseed meal, a substance rich in protein, evidently was beneficial to the sheep in flesh production. Barley and linseed meal, a ration still richer in protein, made the next best showing to the last preceding. The addition of linseed meal to the corn, in either case, increased both the gain and profit.

At the Massachusetts State station in 1892-93, experiments on two lots of lambs, one of which was fed a carbonaceous ration and the other a nitrogenous one, gave no materially different results.

Feeding experiments were conducted from 1890-1892 by the Halle experiment station in Germany under the direction of Messrs. Maercher and Morgen, to ascertain the effect of various rations. Some of this work in a measure included the subject now under consideration. In a majority of the cases, where a ration rich in protein was compared with one poorer in protein, the sheep fed the richer food made the largest gains in live weight, although there were two exceptions to this. In two cases the value of the mutton produced on the richest ration was rated higher, in one lower, and in another just the same.

These experiments, which are among the leading ones conducted, give no very pronounced results during fattening, in favor of one or the other ration, in influence on the production of fat or lean meat in the carcass. The differences in gains are small, in most cases, while slaughtering shows no very striking difference in the appearance of the carcasses in those cases reported.

When we consider the one most important factor in feeding, the relation of gain in flesh to cost of the same, in the Central West we find it to be in favor of feeding fattening sheep corn, rather than using heavily of foods rich in protein, as is so customary in Europe or the Eastern States. A grain ration consisting largely of corn, with a small per cent. of some food rich in protein, such as linseed meal or gluten feed, will probably produce the greatest gain in weight at the least expense.

In feeding fattening sheep, two things of interest are to be noted, in connection with these two kinds of rations under consideration. In most of the experiments where detailed records were kept, those sheep receiving the most nitrogenous food yielded the greatest crop of wool, and also drank most freely of water. The wool of course plays its part in the income, and so it will no doubt be well to have this fact in mind while mixing the rations.

In this time of low prices of corn, the feeder of sheep in Indiana, Ohio, Illinois, Michigan and Wisconsin cannot afford to purchase heavily of linseed meal, bran or other higher priced feeds, but if he is in the breeding business, and intends to carry his sheep in good growing condition through more than one breeding season, then it will be wise to feed a nitrogenous rather than too carbonaceous ration. There is evidence at hand to demonstrate that animals fed nitrogenous rations have a better development of bone muscle and the vital organs, and contain more blood in their circulation than do those that subsist on corn and grass or hay. Such animals grow faster and stronger, and make better breeding stock than the fatter, softer, corn fed ones. While it is true that this is most strikingly shown in the case of the pig, it will doubtless prove equally true, though in perhaps a lesser degree, with other farm animals. In view of this fact, our breeders will do well to add bran or linseed meal to their corn, at the proportion of about two parts corn and one of bran, or four parts corn and one of linseed meal, or if fattening sheep, the proportions of bran or linseed meal may be materially reduced over this. In any event, of course, it is to be conceded that the most important thing is to produce the greatest amount of flesh in fattening, at the smallest expense, and during present low prices we must depend on Indiana corn largely to bring this about.

Mr. Duncan: Can rye be grown successfully to sow it in the springtime for fall pasture?

President Phelps: I have been in the same position; lambing time approaching and no milk; I went to the market; I bought a lot of cheap bran and oats, and I fed them bran and oats and they manufactured the milk. Give them plenty of bran, oats and water and they will give plenty of milk.

Mr. Robe: I sow rye in the spring-time as early as I can get the ground in order.

Mr. Mitchell: I pastured the rye all through the winter some 6 years and I found that I was getting to have a short crop of hay, so I let the rye grow up for hay and took up some 18 loads cut in the bloom. I was breeding shorthorns at the time and I fed it in the morning and I had not fed it very long until my fine cows had calves and no milk. I stopped feeding. I wrote my son in college and he submitted the matter to them and answered back that the bloom of rye produced abortion, and I find it is dangerous to feed it to lambs. I want to ask Mr. Plumb which is the best, linseed or cotton seed meal? Whether one is as good for cows as the other?

Mr. Plumb: I do not think it is as agreeable to the taste as the linseed. If one in these times will buy the gluten feed and gluten meal (they are both from the glucose factory and are cheap), they can feed that. Gluten feed was offered me at $10 a ton. I do not see why gluten feed should not almost take the place of oil meal.

Mr. Mitchell: Hay made from rye straw does not affect mares in foal, but it does affect cows and ewes.

"HANDLING LAMB WETHERS FOR THE MARKET."

BY HENRY LEAMING, ROMNEY.

The proper time to begin preparing lambs for market is before they are born. Constitution, or the ability to assimilate food and grow and fatten rapidly, comes from the parents. The ewes should be thrifty, and well fed during pregnancy, the ram not abused by overwork. I am sure that great loss is often sustained by giving the ram too many ewes. When allowed to run with the flock during rutting season, there should be one ram to each twenty-five or thirty ewes. Gen. 32, 14. The lamb from an ill-used ram, that is so weak when born that it can not get on its feet for a half hour, can never have the stamina or constitution of the one from the sexually strong ram, that comes strong and hearty and gets right up and takes care of himself. The docking and trimming should be done when the lamb is about two weeks old, and an antiseptic used on the wounds.

In salting lambs, I give ashes mixed with the salt in proportion of one of salt to two parts of ashes. This mixture has a good effect in checking injury from stomach worms, and the lamb is not apt to take an overdose of salt, which will give diarrhoea, and sometimes cause death. Putting the lambs in the cornfield to wean is my favorite way. There they soon learn to eat corn, and afterwards when put in the feed lot they lose no time learning to eat it. If at time of putting into feed lot your flock of lambs is mixed as to size, age, or thriftiness, sort them, putting those of a kind together as nearly as possible. For the small or weak do not have equal chances with the strong. Try carefully, and should you find any with diarrhoea, from stomach worms, give remedy at once. It will not pay to try to fatten an unhealthy animal. Do not feed against disease, wind or rain.

If a lamb is uncomfortable from hunger, thirst or being wet, hot or cold, he is not putting on weight as he should. Supplying good air, food and water, in right quantities at all times, and in proper places, to his animals constitutes the feeder's art. Air is not good for a feeder's purpose if it is loaded with ammonia, carbonic acid, sulphuretted hydrogen or has a velocity of 60 miles per hour at a low temperature. Food is not good if it has not the proper elements of nutrition; or if in unpalatable or indigestible form. Water is not good for the feeder's use if it contains germs of disease to which his flock is liable, or anything that makes it offensive to taste or smell.

Shelter is required to keep the flock from losing weight in times of storm. The ideal shelter is light, dry and airy, but without draughts. The feed lot with east, north and west sides shedded, and with a tight board fence for windbreak on the south is good enough. And if the feed and water can be given under cover, all the better.

What shall we feed? Many of us use corn for the grain ration, for to dispose of this, our main crop, to best advantage is our aim. And in feeding for fat no other single grain is better. But as lambs should be kept growing in bone and muscle, it is better to add oats to the grain ration; say half and half. I have had no experience in feeding turnips or beets to sheep, and while they are said to make good additions to the grain rations, would, I think, make the feeding much more expensive. Flat troughs, about one foot wide, with sides four inches high, are nice to feed ear corn in. A pole or board should be fastened over them endwise, about one foot above, to prevent the lambs from jumping into them.

For forage, I have found nothing better than first-class corn fodder, and know of no better way of giving it to the flock than putting it in a rail platform, on a rail pen about three feet high, with one side open so the lambs can get under the platform. The weight of the fodder above holds the stalks firmly, and they are well stripped before being pulled down. If hay is fed it should be in a box rack, a manger, with the opening a foot or foot and a half above the ground, and wide enough for the lamb to get its head through easily; six or eight inches wide. If the lambs stand with their heads in the manger and eat, they do not waste hay as they do when they pull it from a rack. The trough for the salt and ashes should not be forgotten. The great English experimenter in feeding, Mr. Lawes, found that in well bred mutton sheep of the same age food was consumed in almost exact proportion to the size or live weight. Two Cotswold sheep weighing 120 pounds each ate as much food as three Southdowns weighing 80 pounds each. But the two Cotswolds gained more than the three Downs. The average increase for one hundred pounds live weight was with the Cotswolds 2 pounds, 2 ounces per week, and with the Downs 1 pound, 10¾ ounces per week; both lots having precisely the same food. That is, the two Cotswolds weighing 240 pounds ate the same food that the three Downs weighing 240 pounds ate; but the two gained, at the end of the experiment, 34 pounds, while the three gained but 27 pounds.

If weight is the main point to feed for, then the large breeds are the most profitably fed. But quality of mutton cuts a large figure in the market, and it is wise to study the needs of the market before buying feeders. In Mr. Lawes' experiment 20 per cent. better price for the Downs would still leave them eight cents behind the Cotswolds in profit. The 34 pounds of increase of the large breed at 5 cents would be $1.70; the 27 pounds of the smaller breed at 6 cents would be $1.62, the difference being 8 cents.

A lamb of any of our medium sized breeds of sheep, with a good mother and on good pasture, will gain an average of one-half pound per diem until weaned. If born the first of May it would weigh on the first of October following 77½ pounds. It would take a skillful feeder to go on after the lamb is weaned until it is a year old and make the same daily gain. Milk and grass make a combination of food unsurpassed for lambs, and the five months after May 1 are the best five, in succession, for making weight or growth.

A lamb six months old should eat one and one-half pounds of grain per diem, and gain in weight one-third of a pound. That would be nearly 2½ bushels corn, and at 20 cents per bushel, 50 cents for a three months' feed, and a gain in weight of 30 pounds, which at 5 cents per pound would be $1.50. Or we may change the figures, and say 2 pounds of corn per diem, or 3 1-5 bushels for the 90 days' feed, and 25 cents for the corn would be 80 cents, and 12 pounds per month gain, 36 pounds for the three months, at 5 cents—$1.80.

To succeed well in fitting lambs for market, as in any other business, requires close attention to details. There is no stock nicer to handle, and I believe none will pay better at present prices.

Mr. Plumb: I would like to make a statement before the Association. It is simply an individual opinion of my own, but I believe this Association does not gain anything, and I think it will lose something by appointing it a year in advance, but it seems to me, and I go on the basis of what is being accomplished by other Associations, that a program could be gotten out with more certainty and satisfaction if it were gotten out two or three months before our meeting, and it seems to me by that which is being done by the masses of the associations, that the Secretary should get out the program two or three months in advance of the meeting. I believe that if we could have a meeting of two days and one night, or simply two days, and draw upon a larger number of men, that we could have a stronger association, a more aggressive one and more effective.

Mr. Sunman Spade: I am not a member now, though I was one of the original founders of the Association, and the way we formed our Association we had 150 people there every meeting and we had a big, enthusiastic meeting. We let the secretary and the committee who had charge of our business prepare the program when they sent out notices of the annual meeting, and they were always a success.

Moved to adjourn at 5 p. m. until 9 a. m., January 5th.

Resolutions Committee: Mr. Conger, Mr. Darnell, Mr. Keim.

Program Committee: Mr. Wilson, Mr. Harkless, Mr. Tomlinson.

Meeting called to order by President Phelps 9:15, January 5.

DIPPING SHEEP FOR TICKS.

BY A. W. BITTING, OF PURDUE UNIVERSITY.

The parasite commonly found upon sheep and called the sheep tick is not a true tick, but a wingless fly. True ticks are closely related to spiders and have eight legs, while this parasite has but six. As it is so universally called a tick, no attempt will be made to correct the name.

The parasite is not a native of this country, but of Europe, from which place it was introduced with the early importations of sheep. The losses which it causes are not due to killing the sheep or injuring the wool, but to the constant torment and irritation caused by biting and crawling over the body. It is difficult to estimate the total loss to a flock, caused by the presence of ticks, but it is unquestionably quite large. To overcome this loss, sheep may be dipped and the parasites destroyed.

The Parasite.—The tick, Melophagus ovnius Linn., closely resembles true ticks and is often classified as such. They are about a quarter of an inch long and have a body about half as wide as long. The head is broader than the anterior part of the body to which it is closely attached.

It has a strong tubular proboscis, well protected and provided with a row of saw-like teeth. The legs are strong and well adapted for moving through the wool. At the end of each is a strong claw for grasping the wool and holding tightly. The body and legs are covered with short, stiff hairs or bristles, the skin is unsegmented and is very tough and leathery. The color is a reddish gray.

The tick is rather remarkable in that it does not lay true eggs, but brings forth its young as pupæ. The pupæ are large, covered with a thick, shining membrane, causing them to look like seeds of some kind. The number of pupæ which each female will produce in a lifetime is small; some authorities claim only one or two are produced, while others place the number as high as eight or nine. This much seems to be known, that they bring forth only one at a time. The pupæ case is held upon the body by a slightly adhesive paste, which sticks to the wool.

The length of time the pupæ remains within its case is not fully determined. I saved a large number of eggs from the sheep which I dipped last summer and found all that did hatch did so in less than twenty-five days. Most of them hatched between the seventeenth and twenty-second day. When the time arrives, the pupæ case splits across the end and the tick emerges from its case with all the characteristics of a full-grown tick. It remains close to the body, but only attaches itself, at one time, long enough to fill up with blood.

The ticks are found upon the sheep at all times of the year, but are more numerous in the spring than at other seasons. After shearing they cannot find protection upon the old sheep and migrate to the lambs. In flocks that are badly infected I have taken from eighty to two hundred ticks from single lambs. As their food consists wholly of blood sucked from their hosts, it is evident that such numbers would soon cause serious losses. Experiments conducted by Dr. Curtice tend to show that the tick will die if removed from the sheep for more than four days.

The parasite passes its entire life cycle upon the body of the sheep and produces a comparatively small number of young, therefore it should not be a difficult problem to handle. It is conveyed from one sheep to another by contact and by its dropping off of one sheep upon the bedding or floor in a stable and crawling on another when opportunity presents itself. When the transfer takes place through the litter it must occur within four days from the time they dropped off.

The remedies used for the destruction of the sheep tick are essentially the same as those used against scab. The scab burrows under the superficial layers of the skin, while the tick is wholly exposed and therefore a much weaker solution is found to be effectual. In practice it has been found that the tick dip may be used at half the strength as the scab dip. The ingredients for a dip may be home mixed or be purchased ready for use. My experience has led me to prefer the preparations offered upon the market, for when all things are considered, they are the more economical.

This certainly is true for dipping small flocks of from twenty-five to one hundred.

I herewith present a number of the standard formulæ for scab dips and they may be used at half strength for dips.

Curtice Dip.—Tobacco leaves, 50 pounds; sulphur, 10 pounds; water, 100 gallons. The tobacco leaves are first well steeped in water for an hour and a half, the leaves are removed and the sulphur added and boiled for an hour. Keep the bath stirred and use while warm.

Tobacco Decoction.—Tobacco leaves or stems, 200 pounds; water, 100 gallons. Steep for an hour and a half, strain and dilute with 8 volumes of water. Use same as the former dip.

Texas Dip.—Tobacco, 30 pounds; sulphur, 7 pounds; concentrated lye, 3 pounds; water, 100 gallons. Steep the tobacco as for the first dip and add the sulphur and lye.

Law's Dip.—Tobacco, 16 pounds; oil of tar, 3 pints; soda ash, 20 pounds; soft soap, 4 pounds; water, 58 gallons. Steep the tobacco and add the other ingredients while hot. Stir well.

Roloff's Dip.—Tobacco, 20 pounds; water, 66 gallons. Steep for an hour. Let it remain at 95 degrees Fahrenheit and add carbolic acid and potash, each 2.5 pounds. Use while warm.

Waltz's Dip.—Freshly burned lime, 6 pounds; potash, 6 pounds; water, 10 quarts; boil an hour and stir occasionally. Add pine oil, 8 pounds, and tar, 2 quarts. Make a tobacco infusion, 20 pounds in 130 quarts of water, and add the lye.

These are the principal tobacco dips, and while they are effective, they are unpleasant to make, must be used warm and must be kept stirred while being used. They leave the wool in a dirty looking condition, and sometimes cause illness.

Lime and Sulphur Dip.—Lime, 4 pounds; boiling water, 2 gallons. When the lime is slacked, add sulphur, 2 pounds. Dilute with 20 gallons of water.

Fort Collins Lime and Sulphur Dip.—Lime, 11 pounds; sulphur, 33 pounds; water, 100 gallons. The lime and sulphur are first thoroughly mixed in a small amount of water and boiled for 2 hours, then diluted to 100 gallons. The dip must be stirred while used and should be at about 100 degrees Fahrenheit.

California Dip.—Sulphur, 100 pounds; lime, 25 pounds; water, 100 gallons. Prepare and use as in the previous dip.

Australian Dip.—Sulphur, 150 pounds; lime, 100 pounds; water, 100 gallons. Unite them as described in the previous lime dips and dilute with 200 gallons of water. Use while warm.

Kansas Dip.—Lime, 7 pounds; sulphur, 22 pounds. Prepare as before and add sufficient water to make 100 to 150 gallons. Use while warm.

Lime Water Dip.—Lime, 150 pounds; water, 150 gallons. Use while warm.

Nevada Dip (modified).—Lime, 20 pounds; boiling water, sufficient to slack. While yet boiling, add 10 pounds of sulphur. Stir well and add 90 gallons of water. Use while warm.

The lime dips are effectual, but injure the wool and are very irritating. They should be used warm and kept well stirred.

Arsenite of Soda Dip.—White arsenic, 1 pound; carbonate of soda, 1 pound; water, 30 to 40 gallons. Dissolve the arsenic and soda in 1½ gallons of hot water and add 30 to 40 gallons of water.

Arsenic Dip.—Arsenic, 2 pounds; sulphur, 4 pounds; carbonate of soda, 2 pounds. Dissolve the arsenic and soda in boiling water and add the sulphur and 100 gallons of water.

Mathew's Dip.—Arsenious acid, 1 pound; alum, 10 pounds; water, 12 gallons. Boil the arsenic and alum in 3 gallons of the water and add the remainder.

Schnerle and Kehm's Dip.—Arsenic, 1 pound; alum, 12 pounds; water, 25 gallons. Prepare the same as Mathew's dip.

Clement's Dip.—Arsenious acid, 1 pound; sulphate of zinc, 5 pounds; water, 13 gallons. Let boil for 10 minutes and use while warm.

The arsenical dips are excellent dips, but need to be handled with care. They should be used while warm and be kept well stirred.

The sheep's head should not be forced under water, as danger would result from swallowing the fluid and the eyes would be irritated. After the sheep are dipped, they should be kept upon the barn floor or in a bare paddock, until they cease dripping, as large fatalities have occurred when they have been turned at once upon grass. The water dropping from the fleece upon the grass will contain sufficient poison to kill. As far as my experience goes, they are the most reliable dips for scab, but not any better for ticks than many others. They leave the fleece in a slimy, soapy condition.

Kerosene Emulsion.—Soap, 1 pound; water, 1 gallon; kerosene, 2 gallons. The soap is dissolved in boiling water and as soon as the soap solution is removed from the stove, the kerosene is added. The mixture must be thoroughly agitated and the best method is to use a hand force pump, pumping and forcing the mixture back in the same vessel for ten minutes. When a perfect emulsion is formed add 20 gallons of water.

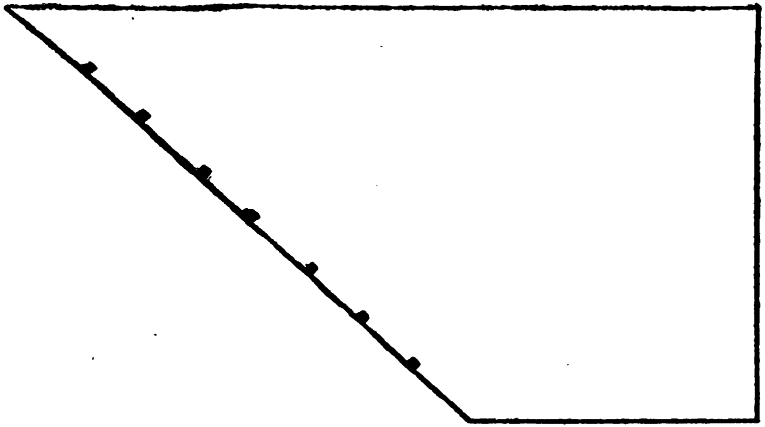
Carbolic Acid Dip.—Carbolic acid, 1 pound; soap, 1 pound; dissolved in 2 gallons of hot water. Add 48 gallons of water.

There are a large number of prepared sheep dips upon the market, the composition of some of which is known and of others not known. Most of the powder dips have arsenic as the active principle; some of the liquid preparations have extract of tobacco as the active principle; others contain derivatives of coal tar and soap in imitation of creolin, and some have unknown composition. The most used powder dip in the State is the Cooper dip, and it is effectual. The tobacco dips prepared by the Scabcura and Black Leaf Sheep Dip Companies are used to some extent. They are more easily applied than to make a tobacco decoction. I have not had personal experience in dipping sheep with these two dips, but have examined flocks within a few days after dipping and found the results to be good. The other dips I have examined are Chloronaptholeum, Zennoleum, Daytholeum and Potter's Perfection Dip. The composition of these dips is not known. They are black, tarry looking dips, have a strong carbolic smell, mix well with warm or cold water, making a white emulsion. They give the effect of a soapy feeling to the hands in a weak solution, but leave a slightly sticky sensation to the fingers when they dry. They retain the same strength as long as any part remains in the vat. They are not irritating, do not injure the wool, and I have had no evidence of poisoning. They look much alike, although the makers claim them to be entirely different.

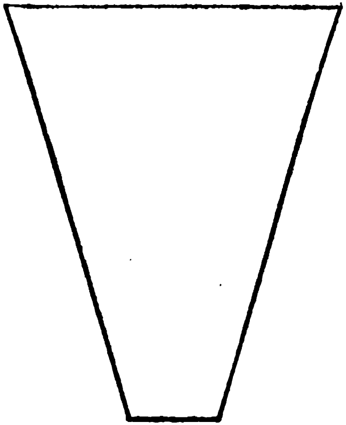
Last summer I made a series of experiments with these four dips, Chloronaptholeum, Zennoleum, Daytholeum and Potter's Perfection Dip. I received samples from the manufacturers and also purchased upon the market. All the experiments upon which records were made were upon the article purchased in the market.

The method was as follows—to capture ticks and take 20 for each experiment, and treat them with dips made at the following dilution: One part in 50, 75, 100, 125, 150, 175, 200, 225, 250, 275 and 300. The ticks were immersed for different periods from 10 seconds to 2 minutes and placed in dry wool at body temperature. In other experiments they were collected together in a small patch upon the sheep and the wool saturated with the dip and allowed to dry in the usual manner. As a practical test nearly 1,500 sheep were dipped, using different strength solutions. A detailed statement of the number of ticks that died and those that survived for the different experiments would be of little interest to you. All these dips were effective at the dilution recommended by their respective manufacturers. All may be used diluted from one-fourth to one-third more than is recommended. The length of time for the submergence of a shorn sheep need not be more than 8 to 10 seconds, although a longer time is advised by the manufacturers. The wool does not take up more water or the sheep become wetter by a submergence of one minute. In dipping sheep for scab, the sheep should be kept in the tank for a longer time to thoroughly loosen the scabs, but the tick is purely an external parasite and long immersion is unnecessary. There was a considerable variation in different samples of the same dip when purchased at different places and at different times. In one of the dips the best sample was two and a quarter times the strength of the poorest. Zennoleum was the most uniformly effective in the seven samples used.

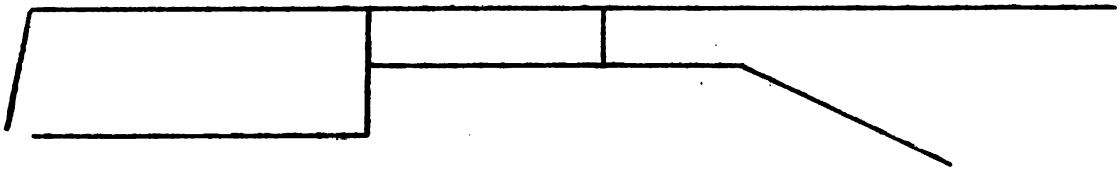
Two of the dips, Zennoleum and Chloronaphtholeum, were tested for the treatment of scab by the Colorado Experiment Station, and the results were very favorable. I have also recommended the four dips for trial treatment for scab, but must confess that the results have not been all that could be desired in all cases. For ticks they have proved very satisfactory.



Tank. Side view. Top, 8 feet; bottom, 3 feet; height, 4½ feet.



Tank. End view. Top, 24 inches; bottom, 6 inches; height, 4⅛ feet.



Plan. Dripping floor. Tank. Chute.

I am aware that I have placed myself in a position to be criticised for recommending proprietary preparations. I have given the formula for making dips for those who can and wish to make their own. I have given the results of some experiments and personal observations upon a number of prepared dips that were found to be effectual. I cannot guarantee what the quality of these dips will be this year or the year after. The samples tested were obtained upon the open market and should therefore represent the goods offered for sale. There are probably other good dips upon the market which I have not had the opportunity to use. I will say that I believe that most sheepmen will find it more economical and handy to use any one of the good sheep dips rather than to prepare their own decoctions. I will add that I do not take stock in the claims made that dips are a wool stimulant and that the increased growth will pay for dipping. The observations upon that point are altogether too meager to warrant such assertions.

The arrangements necessary for dipping may be very simple; a store box large enough to hold a sheep when turned upon its back and a few boards upon which to lay the sheep to drain off the surplus dip are all that is necessary. For lambs a barrel with a few inches of the top cut off will suffice.

With such improvised arrangements the labor and waste of dip soon make the dipping of a large flock a tedious task and the job goes undone. With a proper dipping tank the labor is greatly reduced and the saving of dip soon becomes an item of account.

A good dipping outfit is not as expensive as many suppose, as the principal item will be the tank. The tank should be built as indicated by the accompanying sketch. The tank should be built as a large trough four and a half feet deep, two feet wide at the top and from three to eight inches wide at the bottom. The back end should be vertical. The bottom should be three feet long and the top eight feet long. The front end of the tank will make an incline from the top to the bottom for the sheep to walk out. Cross cleats should be nailed to the inclined portion to give a foothold. The tank should be built out of well seasoned inch and a quarter lumber. There are steel tanks upon the market to take the place of the wooden one here described. The use of such a tank will reduce the labor, the quantity of dip use and the chance of accident to the sheep to the minimum.

The dripping floor is easily provided at little or no expense. A good wagon bed with a water-tight floor answers the purpose perfectly. If the floor is not water-tight, three yards of oil cloth costing from 45 to 60 cents will make it so.

The arrangement of the tank should be such that the sheep may be driven into it without lifting or raising them, and the drainage floor placed so that the sheep will walk upon it in getting out of the tank, and after standing for a few minutes can be let out onto the ground. If the tank is to remain in one place permanently, it should be sunk into the ground beside a fence. Another fence should be built to act as a shute to drive the sheep to the tank. The dripping floor must be placed upon the level of the top of the tank and made to extend over it an inch or two. It should be inclined to the tank so that the surplus dip will return. If it is not desired to locate the tank permanently, it is often found practical to place the end of the tank against the back side of the barn upon a level with the threshing floor and back the wagon up against the front end of the tank to serve as a dripping floor. Sometimes a shallow hole of a foot or a foot and a half will permit of making such an adjustment of heights with little work. The sheep may then be driven from the barn into the tank, allowed to drain in the wagon and let out at the front end gate. With such an arrangement from sixty to seventy-five sheep or a hundred lambs can be dipped in an hour. One man must stand at the head of the tank and put the sheep in, while one or two more will be required to drive them up. One tank will suffice for a neighborhood.

The best time to dip is at shearing and then again in about three weeks. At this time the fleece will take up the minimum amount of dip and all ticks will be destroyed. None of the dips will kill all the eggs and a few ticks may get back upon the sheep after dipping, so it is well to dip a second time. The sheep should be carefully examined in the fall and if a tick is found they should again be dipped. Where a good job has been done the fall dipping will be unnecessary. It is not advisable to dip sheep in the cold part of winter if it can be avoided. It will, however, be found better to dip if it is found that the sheep are suffering than to let them go without. Under such circumstances it is always necessary to use warm dip and provide warm quarters. In early spring it will be found advisable to shear early, dip and provide close protection. This is especially true for the latter part of March and for April. Some of the dips may be used warm or cold. It will always be found profitable to warm the dips, as they are more effectual than when cold, and the sheep will not shrink from sudden chill. During the hot part of summer this is not so essential as in spring or autumn.

The amount of dip required will depend upon the length of the fleece, from one quart to more than a gallon per head. The cost of the dip will range from one-third of a cent to four cents, depending upon the kind of dip used and the number of sheep dipped.

Another usage for the tank is to dip pigs and hogs for lice. A false bottom is placed in the tank about a foot and a half from the bottom and the hogs are driven through. Kerosene emulsion makes a good dip for the hog louse. I have also used the four dips, Zennoleum, Daytholeum, Chloronaptholeum and Potter's Perfection Dip, for the same purpose with excellent results.

Mr. Robe: I would like to know what you consider the one best dip for ticks and scab?

Mr. Bitting: In most cases I would send for Zennoleum because it is a little stronger than the others and I have never suffered any harm from them.

Mr. Privitt: I would like to ask if you have ever had any experience with the coal tar preparation?

Mr. Bitting: No; that dip and the MacDougal I have never had an opportunity to try. We have taken ticks by the hundreds to the laboratories and have immersed different ticks in the solution, and have come to the conclusion which should be used. The first thing that started sheep dipping was that of Governor Mount's sheep in July, and after that we had more dipping than we could do.

"METHODS OF ADVERTISING PURE-BRED SHEEP."

BY MR. SID CONGER, FLAT ROCK.

Mr. President, I am satisfied that if this had not been made out earlier in the season, six or eight months ago, that no one would have asked how they should advertise sheep, because at the present time they sell themselves, but for fear we might get into that trouble again I will tell you how I keep track of my advertising. When I desire to advertise I take a paper that has a large circulation, that goes into the hands of the people who take interest in live stock; I advertise at the top and bottom of the column; then give my box number and address, Flat Rock. I always use odd numbers like 1, 3, 5, 7, etc., all except 1. Then each day as I get inquiries from these box numbers I make a memorandum on my desk. Box No. 3 so many; Box No. 5 so many. Now it is not always the paper that furnishes the most inquiries that gets the most sales, so you will have to watch that and each month credit that up. I want to say, gentlemen, that there are papers in this country that do not bring you two sales per year. There is one paper that brings me 90 per cent. of my sales, but there are others that do not give me two or three sales per year. Of course, I believe that it is actually essential that you attend shows and fairs, and show your stock in a good way. I believe that more people will see your stock there and you know seeing is believing, for they see it and know what they are getting, which is not true in the case of printer's ink. My sheep sales come from the Breeder's Gazette. It will sell all the stock you want to sell. The National —— is a good paper and tip top. I speak of the Breeder's Gazette as a general paper.

WOOL GROWERS' ASSOCIATION.

BY GOV. JAMES A. MOUNT.

Mr. President and Gentlemen of the Indiana Wool Growers' Association—I am glad to greet you at the beginning of this new year and the beginning of a new era of prosperity in wool growing. Four years ago I was accorded the honor of addressing this Wool Growers' convention. I reviewed in my judgment dispassionately the one interest of this country at that time. You will remember, if you will refer to the report of '96, that I warned the farmers against going out of the wool business by reason of adverse conditions then confronting us. I pointed to the fact that the consumption of wool in the United States was increasing; that the consumption of mutton was increasing. I stated at the conclusion of that address that we were now going to the reverse side of this industry; I said, furthermore, that in less than five years we will be going in a different direction in favor of this industry. At that time farmers were sacrificing their flocks, selling good flock sheep from $2 to $2.50 a piece, which would have brought at any other time from $4 to $6 a piece. We find that the 1st of January, 1897, we had but thirty-six million sheep in the United States; there has been a decrease of two to three million head annually when there should have been an increase. The demand for mutton is greater than ever before in this country, and the next difficulty manifested will be the mutton supply in the market, and we will have extreme prices in mutton and you will find increased prices in wool. I have a just pride in Montgomery County. Our wool merchant has been in the market paying the best prices because we hold that we raise the best wool in the country. He cleared in this transaction nearly $11,000. I am glad with the man who had courage to buy the wool even if he could not immediately sell his wool. I am glad my friend had samples here yesterday, showing that we raise the best wool in Indiana. Now I am not going to discuss any kinds of breeds of sheep. I have said that I am not in the sheep husbandry and that I am not a breeder of sheep, but raise them for the money there is in them and for the money there is in the wool. I would not go and buy these high-priced sheep and pay fancy prices for them; I would buy common stock sheep and then breed them. You can build up sheep quicker than any other live stock on the farm. A few years ago I was raising Cotswold wool because the market was demanding long wool. I found that the Cotswold wool was too open, at the same time the market demanded a shorter wool; then I crossed with Merino to bring up that class of wool that the market demanded. I understand that it was intimated yesterday that this was proving the ruin of the country. I believe, gentlemen, that the cross between the Merino and Cotswold wool gives the best wool in the market. This year I find these five millions want ordinary Merino. I think next year I will go back to the quality of Merino, keeping these, for we want a profitable fleece and profitable mutton for the market. I had the pleasure of being at home last Sunday, and I think that which cheered me most was when my 150 lambs came into the barn white and neat. I believe to-day of all the live stock interest it points all the more to sheep husbandry than to any other in the market. For the last year I have stocked in beef cattle. There is an advantage in that also. We find from 1890 to 1892 an increase from twenty-one to twenty-seven million beef cattle. The increase was at an abnormal rate. In the last five years we have shrunk in beef cattle in number in the United States seven million head. It is difficult now to find beef cattle. The farmers put their beef cattle into the dairy business, so farmers not watching the market closely have neglected the beef question, and I believe for the next few years there will be greater profit. I will tell you about horses. You take from 1880 to 1892; the increase of horses was 105,000 annually. What was taking place in this country? The electric motor was taking the place of horses; the bicycle was taking the place of the horse, and the farmer did not take into consideration this abnormal increase. The farmer now thinks nothing of horses, but he had better look after getting seven millions of draft horses so by the time the market changes they will be ready for the market. Now, because for the past two or three years they have raised no horses the market will have demand and no supply, so these economic questions all along farmers' lines have to be watched carefully.

I am glad to say to you men engaged in wool growing, those who have been increasing instead of decreasing their flocks are on the way to prosperity, and I think next spring when we sell our wool at 20 cents that the farmers will be able to sell their sheep at $5 or $6 a head. The trend is evidently upward and this is not temporary when thirty-six million sheep this year are producing 300,000 pounds of wool when the supply calls for three hundred million pounds. Then I may say another thing to these farmers: I regret that as farmers we are such bad economists.

I am glad to greet you wool growers and I hope, gentlemen, that you will continue to multiply your flocks and take up the sheep husbandry in our State. To see the pasture growing up in weeds and the ragged condition of our farms, I wonder that more do not see the value of keeping sheep. You can tell the farm that keeps sheep on it. I noticed last summer that many wheat crops were taken with white top. If you keep sheep on your farm you will not have white top. The blue grass pasture and meadows will be kept entirely clean by sheep and so very many of the noxious weeds will be kept down. Gentlemen, you will pardon me if I seem to be a little too enthusiastic in the sheep business, but I expect confidently to get more profit out of the sheep husbandry than out of any other part of my interests.

Thanking you for the privilege of calling upon you and addressing you.

In regard to this fleece: A sheep that carried that fleece of wool will in heft give a splendid fleece. and then for the quality, in my judgment, it will meet the highest demand of the market. I will pronounce that a class of wool that will bring the top price. This was taken from the Merino and Cotswold. I cannot say that I favor the Tunis sheep, but I do say that Mr. Roundtree is making a great success in sheep and wool growing.

Mr. Collins: Speaking about white top in the fields, I want to say that I saw two farms adjoining lots, both black ground, both cornfields. When the time for breaking came the man who had sheep had not a bit of wild lettuce in his field, but the other man had wild lettuce in all his fence corners, enough to scatter over the entire field.

RESOLVED, "THAT INDIANA WOOL GROWERS SHOULD HOLD THEIR MEETINGS AT DIFFERENT PLACES IN THE STATE."

AFFIRMATIVE, THOMAS BOWLES; NEGATIVE, C. A. HOWLAND.

Mr. Chairman, the question was assigned to me, but find the men who talk about the Indiana Wool Growers' Association. Why, what is it, and where does it exist? We have met in Indianapolis different men, and it is possible that this question has presented itself to every one of them. For instance, why not hold every form of institution in the city of Indianapolis, and the reason of it is because they must get at the people who pay for it. Men become interested. I will ask if Mr. Bitting's address is not worth the expense of any farmer's coming to hear it. To get that out among the sheep breeders we want it to go out to the farmers. We sometimes think Marion County is the place to hold this meeting, but other counties object; we have twenty-five sheep to the square mile, while Marion has but five, but it is my opinion that if it were held at Fort Wayne or at Terre Haute or Columbus, go down among the wool growers, the meeting would be better attended. It is quite an expense to come up here and pay the hotel bills, railroad fare, etc. My opinion is to change these places every year. For instance, meet at Lafayette; that would take in the northwestern part of the State; then at Columbus, which would take in the southern half of the State. Men who would come would get interested and go into the business. The policy of the wool growers has been working under a disadvantage. We were quoted as having but twenty-five members here. Twenty-five would not be 5 per cent. of the wool growers in Indiana and we will meet them if we meet in different parts of the State. Mr. Howland is very conveniently located, can come to town for a nickel, can go home to dinner, and I am sure will not seriously object to going to different points for our meetings.

Mr. Howland: Mr. President and Brother Wool Growers, I have always tried to be an accommodating gentleman. I would like to take the institution, if it were possible, to the very door of its friends. Why, we would like jaunting around and meeting the people and doing what good we could, that is, if it were possible, but facts are stubborn things. When we look at this in its true light, what do we find? My friend says they have institutes held in the different counties of our State. These are county institutes; that is why they are not held here, but the State Fair, that is a State affair. Why do we not take that around? We did it, but it was a failure. You cannot move such large institutions. Well, this is an immense thing. I was at the first Wool Growers' Association ever held. There were two or three like it, and we required a very small room.

All roads in the State of Indiana lead to Indianapolis. All the people of Indiana claim the City of Indianapolis as their capital. It is not only our men who use our capital. The good people of the State of Indiana desire to come to the capital. Every six months they ought to come. She now has 200,000 inhabitants. If you held meetings at other places they would never know they had a capital, and perhaps they never would come here. All roads come in here, but if you go to Lafayette you have to transfer; you cannot go direct. Then take up the institution. Who constitutes this institution; who are the promotors of this organization? I have attended every one of these meetings but one. Who have I found here? Mr. Duncan, Mr. Darnell and three or four more. The balance were here one year and then skipped two or three years, and they were not near so faithful as these organizers. What would our meetings be without these old standbys? Of course we want to get young blood into this organization.

Another thing. All the other associations meet here, the Swine Breeders', the State Veterinary and the Bee-Keepers' Associations, and we can attend these. This being a State institution, it should be held at the capital of the State of Indiana, and everybody outside of the city is just as much interested in the capital as those living near it.

Mr. Guthrie: It seems to me that it is right enough to meet at the capital, but we might quarterly or semi-annually meet at some other point during the year. Now, there are a great many who come to this meeting year after year, time after time, and give their same experience. It seems that if we had new blood in this, while we need the old members for counsel, we would have more enthusiasm if we could have new attendants and get them interested, but the State capital is the place for the annual meeting.

Mr. Cotton: While I am in favor of holding the annual meeting at the capital, we might hold what we call a summer meeting also. It would stir up an interest and bring in new members who could learn something about it. We formerly had two meetings, one in January and one in June.

Mr. Konkle: I know that it would be desirable to a large portion of men, who take more or less interest in wool growing and sheep husbandry, to have the meetings of the Association at some other place that would not require them to travel so far to get to them, but at the same time if we should move it north, while it would be much more convenient to me, it would be much more inconvenient to those in the extreme southern portion of the State, and I doubt, myself, whether, everything taken into consideration, it would be an advantage to the Association or to the interest it represents by attempting to move it from what is nearly the center portion of the State. For the purpose of testing that question and to try to accommodate all as nearly as possible, I move to amend the resolution by making it read, "Resolved, That the Indiana Wool Growers' Association shall hold a meeting in June at Goshen, Warsaw or some other county in the north, to be known as the semi-annual meeting of the Indiana Wool Growers' Association." We can try it and see what the effect will be. I believe that the results will be good and will advance the interests of the State. If I can get a second to that motion I will ask that it may be considered and voted upon.

Mr. Phelps: I think the time would be more favorable the first of August.

Mr. Howland: I would suggest that August be a better time and it would be very agreeable to go up to some of the summer lakes and have a general good time. I think we would have a good attendance.

Mr. Colling: Moved that the motion just passed be reconsidered.

Mr. Cotton: I move that we hold a summer meeting at some point. as the Executive Committee may determine, some time in August.

Mr. Howland: At what time would this Executive Committee be appointed?

President: When the next officers are appointed.

Mr. Bitting: I wish to make one point here; that next year the wool growers should take some steps to require the dipping of sheep in this State. At the Chicago stockyards all sheep that go through there must be dipped, but at the present time sheep coming to our stockyards here are not dipped and many of them are affected with scab. It would be a very simple matter for the wool growers to take up the matter and put it before the Live Stock Commissioners.

Mr. Howland: Why not attend to it now? I believe there is need of it. It is a well-known fact that there are scab sheep turned out for breeding purposes, and it is getting to that point that men will be afraid to go to the stock yard and buy sheep for the reason that they may carry out some germ of this disease. I think now is the time to take this matter up.

Mr. Bitting: I have had some conversation with the United States inspectors of the stock yards here and also with the Governor, and it is a little doubtful if the Live Stock Commissioners under the law can handle that successfully.

Mr. Howland: It would require two years before we could recommend it.

Mr. Darnell: There is one thing in the President's address that I wish to recommend: That the name of the Association be changed from the "Indiana Wool Growing" to the "Indiana Sheep Breeders' Association." I think there are more, perhaps, than wool growers. The others have Swine Breeders, Poultry Breeders, etc.

Mr. Cotton: I have no objection to it being called "Wool Growers and Sheep Breeders."

COMMITTEE ON PROGRAM REPORTS.

1. Farmers' Sheep ....Thos. J. Lindley, Westfield
2. Profits of Sheep as Compared with Other Products of the Farm ....C. A. Howland, Indianapolis
3. What Benefit Does the Average Sheep Breeder Derive by Attending the Agricultural Fairs and Watching the Judging of Sheep ....J. L. Thompson, Gas City
4. Mutton v. Beef—Relative Cost of Production.................. ....Prof. C. S. Plumb, Lafayette
5. Should Ewe Lambs be Bred?.............W. H. Hornburg, Gillman
6. Why Is There so Much Fatality Among Lambs During the Summer? ....Mortimer Levering, Lafayette
7. What Benefits Are Derived by Wool Growers at Their Meetings...I. N. Miller, Upland
8. Resolved, "That Indiana Sheep Breeders Should Breed First for Mutton and Second for Wool"..........T. C. PHELPS, Greensboro

J. R. TOMLINSON,
BERT WILSON,
J. B. HERKLESS,
Committee.

J. B. Herkless, Carthage, is elected President.

Mr. Herkless: Gentlemen of the Wool Growers' Association, this is something lately sprung on me, and I am not prepared to make a speech on it. I thank you, and shall say more as the business proceeds.

Mr. Phelps: I want to thank the members of the Indiana Wool Growers' Association for their good attendance and good attention and good behavior, and am grateful for the good time we have had in the past few years while I have been present. Thank you, gentlemen.

President: J. B. Herkless, Carthage. Vice-President: Sid Conger, Flat Rock. Secretary: J. W. Robe, Greencastle. Treasurer: J. L. Thompson, Gas City. Chairman: H. H. Keim, Ladoga. Executive Committee: C. A. Howland, Howland Station; Prof. Bell, Indianapolis.

Mr. Cotton: I think we have the best dog law that we ever had. The law requires the assessor to assess every dog on your place. The assessment takes place in April. He swears you in, how many dogs you have;

you cannot say it belongs to your neighbor or to your son. The assessment lists at $1 for the first dog, $2 for the next and $3 for a bitch, and if you fail to pay he will turn your name over to the county prosecutor. You are liable to a fine every day you keep the dog, and if you do not pay the fine you are liable to imprisonment. Any dog that is found roving around the country is liable to be killed. You can shoot any dog on your premises. If hunters come around with their dogs we have a hunting law that he has no right to hunt with a dog, gun or anything of the kind.

Mr. White: I read of a remedy that may be put in practice until this law would be put in force; that is, soak a sponge in lard and then drop it around your place and the dog will die of the worst case of indigestion possible.

Mr. Konkle: I would like to know if we are properly constituted in regard to fence partitions, which is something very necessary as well as the dog law, and whether the last Legislature has really decided about fixing up fences or not.

Mr. Cotton: We have a very efficient law on partition fences. Three days' notice is all that you need to give.

President: A motion of adjournment will be in order.

Adjournment 12 m.

The Indiana Swine Breeders.

At three ten in the afternoon of the 5th of January, about one hundred and twenty-five breeders of swine gathered in the Agricultural Rooms at the State House. Since noon the boys had been enjoying a social talk and reviewing the business of the year. The time thus passed seemed to be enjoyed by all, and every one was in the best of humor and ready for the call to order by President Harcourt. The tap of the gavel brought every one to order and the business of the Association was commenced by the reading of the minutes of the last meeting, Mr. Allen Beeler acting as Secretary. The reports were approved.

ADDRESS OF PRESIDENT HARCOURT.

Gentlemen and Brother Breeders of the Indiana Swine Breeders: By the blessings of a kind providence we are again permitted to meet in this our twenty-first annual convention for the promotion of the interests of swine breeders. Pleasant associations are again renewed, and the bond of friendship is strengthened, and the interest of one becomes the interest of all, for as brother swine breeders we come to further each other's interests as well as enjoy the friendship which usually prevails. Swine breeding must be pursued as an art, for it is certainly an art to be able to feed and raise a good, symmetrical herd of hogs, and, i. e., requires mind as well as muscle. A breeder must have love for his work; it is one of the essentials of success. The successful swine breeder does not throw a basketful of corn to a lot of hogs of all ages, but, having them divided into separate lots, the younger from the older, he sees that each partakes of its allotted food. No one can make a business a success unless he gives it his own personal attention, and in no business can this be more true than in swine breeding; of course it cannot all be learned in a day, and the young breeder realizes this the better. Study to know what the trade demands and be able to give that which they ask for. A good, growthy pig with fancy points can be as easily raised as a scrub and will bring enough more to repay the man who has taken the trouble and slight experience of raising a well-bred thoroughbred. The breeder who is starting with inferior stock as a foundation herd will in the end find it poor economy, for the best is none too good. The past year has been more encouaging than the former one. The health of the hogs has been better comparatively speaking, and the prices, while not so good as a few years back, have been remunerative. Trusting that we may have a profitable meeting, I thank you for the honor you have conferred upon me.

The first paper on the program was "Swine Breeding in Connection with Dairying," by W. G. Riley. Mr. Riley not being present, on motion of I. J. Smith, Mr. James Riley introduced the subject.

Mr. James Riley: I have not thought on this subject, as I expected my son to be here, knowing he had been studying the question and would present it in full. It seems to me that the pig and the dairy are inseparable, if the best interests of both are considered. As breeders we all know the value of milk for pigs. We are proud of our pigs and wish them to do well in the hands of our customers and do credit to our herds. Too often are our most promising pigs taken from our herds, put in a pen, without cover or floor, and there he remains through all kinds of weather, abused and ruined. and we are blamed. On the same farm perhaps enough milk is going to waste to support and develop several pigs. We know the value of milk and should instruct our customers in its use and how to treat their pigs. It is my opinion if a breeder cannot furnish his pigs milk he had better not try to raise pigs. The two interests are so very closely associated that the dairy is actually necessary for successful pig-raising. For instance, let us, as an illustration, take a farm of one hundred acres: the ensilage and other product are fed to the dairy cows, making milk; that makes butter. the milk goes to the pigs. making pork. The voidings from the stock goes to enrich the soil, and the farm increases in fertility. yet a good living is taken from it by any careful man that will combine the dairy and hogs.

R. V. Bradrick: I think the combination of the dairy and the pig a very important one. Twenty-cent butter or twelve-cent milk is a great thing to the feeder of pigs. Of course all the skimmed milk goes to the pigs. I know a feeder that has a separator; he runs his milk through it and the pigs get the skimmed milk when warm. That is the best way to feed it. The butter is sold at 20 cents a pound. He claims that the skimmed milk is worth as much, used in this manner, as the butter. There is no better way of disposing of the product of our farm than through the cow in butter. the pig in pork.

Dr. Hendricks: I intend getting a separator. I have the cows and have my butter engaged at 22 cents a pound. My purpose is to feed my pigs from the separator as described by the gentleman. I expect to round out my pigs, secure more rapid development and obtain better prices for them.

L. E. Mace: I would like to hear other feeds discussed in connection with milk; we cannot all of us get enough milk to use as described, but can get some, perhaps enough. if combined with other feeds: I mean sweet grains used in fattening and growing pigs.

Mr. Hendricks: Skimmed milk with shorts is better for pigs than whole milk. Whole milk is too strong and tends to break a pig down. It is impossible to make a proportion that will do for all. Your judgment must teach you how much and what to give. All pigs are not constituted alike, and a successful management is that which skillfully uses feed and care so as to make the pigs thrive alike regardless of their different dispositions, constitutions and the many circumstances under which they are handled.

I. J. Smith: It seems to me that this subject is so old that none would require instructions as to its value. So long as I have farmed I have considered this utilizing the by-products as the greatest source of revenue and success. I heard a lady say at an Institute meeting that butter alone would not pay, but when you fed the skimmed milk to the pigs, making pork; to the calves and make feeders; to the chickens and make eggs, and the voidings from all these animals went to enrich the farm, making one of the greatest money-makers. I think we are wasting time in discussing this question. It is the only and proper way to run a farm, and a farmer cannot succeed unless the by-product is used in every department of farming.

Subject two, "The Farmer's Hog," in the absence of D. B. Johnson, was not presented.

Subject three, "How Much and in What Way Has There Been an Improvement of Pure-Bred Swine in the Past Ten Years."

Dr. Hendricks: Last November I received a notice from your Secretary that I was expected to prepare a paper on the above subject. Not having had any experience with hogs, excepting the one breed, the Poland-Chinas, I consider I am not competent to express an opinion on any class except Poland-Chinas. The other day I read a paper on the same subject, by a writer out West. It was a well-written article. He started by a few carefully arranged sentences, complimentary to the several breeds, but when he reached the Berkshire breed it was very evident that this was his favorite. A long column of well-written matter described the grand and wonderful improvements made in the Berkshires. I would be compelled to pursue the same course, only Poland-Chinas would be the subject I would dwell upon.

Subject four was presented in the following paper by James Riley:

State Fairs being under the management of the State Board of Agriculture should be conducted as a practical school of agriculture, where the science of breeding and improvement of all kinds of live stock and farm implements are taught. The Farmers' Institutes are doing a great work in the advancement of agriculture in discussing the theories of agricultural science. The State Fairs should be a school of practical object lessons, where the science of advanced agriculture is demonstrated by facts. Note the wonderful improvement of the Dairy Department of the Indiana State Fair in the last five years from a few samples of greasy butter that would be scored by a modern expert at about 65 to 70 points to a magnificent display of fine butter that scored from 90 to 98 points, and in addition to the fine display of butter and cheese and dairy utensils Professor Plumb and his helpers give a practical lesson on butter-making. The State Board should improve on this line in all the other departments of live stock, especially in the Swine Department; the swine industry is perhaps of more importance to farmers of Indiana than any other branch of agriculture. The hog, by his rapid growth and quick return, brings as much, if not more money to the State than any other product of the farm. As the cultivated taste of the consumer has created a great demand for high-grade butter, so the cultivated taste of the consumer of hog product is discriminating in favor of the higher grade, and is furnishing an increased demand for the best quality of pork. The State Board could very greatly aid the breeder and farmer by improving along this line. Our excellent Secretary of Agriculture, Wilson, has become very much interested in this subject. In his investigation how he might find a market for American products, and in this way be a benefit to farmers and the country, he discovers that the farmers of the United States were losing a great deal of money by not producing a kind of pork that is adapted to the cultivated taste of the Englishman. In his endeavor to find a remedy, his zeal led him to recommend to the breeders and farmers of the United States to introduce the Tamworths. Every breeder should be very thankful and highly appreciate what the Secretary is doing for them in this line. The breeders do not think it would be necessary to introduce the Tamworths, as they believe it is more in the feed and management than in the breed of swine. Now, if the State Board could induce the Experiment Station at Purdue to take an interest in the swine department, as they did in the dairy department, and conduct some experiments in scientific feeding and management with a view to improving the quality of the pork product as the butter product has been improved, it would undoubtedly be a very great improvement. The Superintendent of the Swine Department should appoint a committee of breeders to draft a good program for lectures during Fair week, and have a farmers' institute and swine exhibit combined. The Superintendent could no doubt secure the attendance of professional breeders as speakers, and have a wonderfully interesting and instructive time. There is nothing that would draw out the young breeders and enterprising farmers as well as an advertised lecture from such men as L. N. Bonham, N. H. Gentry, S. H. Todd or Thomas Bennett. These men are recognized authority in the improvement of swine. Their lecture, giving their experience, would be greatly appreciated. Then have a lecture from Prof. Plumb, giving a report of his experiments, and one from Prof. Bitting on the sanitary treatment of swine. A program of this kind for the Swine Department during Fair week would bring more people to the State Fair than the two fast horses did last year, and they would be a class of men that would be of far more substantial benefit to the State Board. If this kind of a program was adopted in all the different departments of live stock, then indeed the State Fair would be a school of agriculture, and its influence would soon be felt as a potent factor in the great uplift of agriculture in Indiana.

Dr. Hendricks: The paper presents many good points, and think that we, as breeders and exhibitors, should give more assistance to our Fair managers. All our Fairs should be very particular about the matter of premiums; they should make an effort to always pay out. Regarding our State Fair, this association should unite in an effort for a liberal appropriation form the State, that some of the thoughts presented in Mr. Riley's paper can be brought in to actual experience.

The next paper, subject five, "What Benefits are Derived by Breeders at their Meetings," was presented in a paper by Lucien Arbuckle, of Hope, Ind., as follows:

This subject should have been given to some older and more experienced breeder than myself, for it is one of importance, and much can be written on the subject. But, as I have not been fortunate enough to attend all of the meetings held by the Indiana Swine Breeders, it will be impossible for me to bring out all the points on this subject.

Now, I will merely tell how I have been benefited by these meetings, and hope that the discussion following will bring out points I fail to observe.

Meetings like the one we are now attending bring together breeders from different parts of the State; I may say all parts of the State. We meet breeders we never met before, and in the papers read and discussions following we hear the opinions and experience of men who have been in the business years before many of us were born; and what it took them years to learn by experience they are kind enough to teach us, so we learn by their experience. Here we hear breeders give their manner of caring for swine; no two give the same method. Yet as we listen, their opinions, different as they may be, we well know they all aim for the same end—to be successful in the business. By this I mean to receive cash enough to pay them for the extra attention and expense of caring for a herd of pure-bred swine, and to raise a sensational prize-winner. Out West they would say a sensational priced hog.

Here we learn from the care of the boar down to hogs for the show ring, the handling of the overfed and petted beauties after the show season, so they will continue to be of value to the owner. Right here we can learn the experience of one who may not have sold a $5,000 hog, but who have bred winners in the strongest competition this country affords.

We, the young breeders, engaged in one of the most profitable and important industries of the State, should pay strict attention to the successful breeders' advice, for one or some of us will some day occupy the place now held by them. Then we have the scoring schools. There the young and old breeders are well brought in contact with the score-cards of the different breds of swine, and learn to score. While we may not be fortunate enough to obtain a license, the knowledge gained is of importance to us. When one has mastered the score-card, he can more readily see the good and bad points in comparing, and no fair association should employ a judge that is not capable of using the score-card. While the judge may not be called upon to score the animal, the ability to use it will make him a competent judge. By learning to score the different breeds, we learn their good and bad points, and can more readily see the superiority of our chosen breed. Still there are some men that do not believe in the score-card or in the single-judge system. Such men generally want the lion's share of the premiums, whether they deserve it or not. Possibly there are exceptions to this, but generally such a man brings out animals that cannot win under the score-card.

Now, brother breeders, I will leave this subject for your discussion, knowing that the breeder who is to open the discussion is more experienced than myself. I will try and learn in the discussion following, points I failed to see and benefits I have not derived by the meetings held heretofore by the swine breeders of this and other States as well.

Adam F. May: In my experience of past years, by attending these meetings, I found out how little I knew about the hog. One of the most pleasant features of these meetings is the opportunity it gives us to unite in social enjoyment, also in reviewing the business of each year.

Joe Cunningham: I think the paper a very good one. Benefits derived from attending these meetings are very great, in many ways, both socially and financially, while we have very large gatherings and from all parts of the State. It has always been a mystery to me why so many breeders, both young and old, absent themselves from our meetings. The pleasures of meeting my brother breeders socially is worth all the trip costs me; even if no educational feature, is one of the greatest attractions of these meetings. I have been attending them from their beginning, and have learned much from this associating with my brother breeders.

Lloyd Mugg: I always enjoy myself at these meetings and receive great benefit. I have one criticism to make; that is, so many breeders refuse to discharge their duty. They are placed on the program, and I consider that an honor, and it is expected of them to have their papers ready. Instead of that, they come with a well-prepared excuse, and expect the older members to take up the subject. The young men should take an active part in this work. They certainly cannot realize the benefits to be derived from such active work, or they would be soliciting the opportunity to take part in the program as an opportunity to induce study and cultivation in the business.

The next subject was, "The Weights My Poland-China Pigs Reach at Six, Eight and Twelve Months, and How I Feed Them." This was to be presented by S. D. Ghere, discussed by Scott Mints; both were absent.

Mr. Tavner Neal made a short talk on his experience in making weights with his favorite breed, the Berkshire. In presenting the care and treatment, he said: The first thing to have is a good strain of hogs, the mellow, rapid maturing kind. They should then be kept in perfect health, not overcrowded with feed or permitted to go hungry; should be fed regularly and just enough of good sweet feeds. In feeding for extra rapid growth, warm sweet milk and plenty of it must be added to the ration. In my experience I have made a pig gain forty-six pounds in ten days. In feeding for the show ring, in addition to milk I use oil meal. This I use in small quantities. I made pigs I now have, that were farrowed the Saturday after the State Fair, weigh this week, the boar 135 pounds and the sows each 130 and 131 pounds. This was done with lots of milk, sweet grains and a moderate use of oil meal.

I. J. Smith: The weights given are good and the treatment appears to be the best. I would suggest that the breeder use, in his next trial, one pound of sugar and six eggs to each pig, at each feed, and his pigs will easily reach 400 pounds.

The next subject was, "Has the Score Card Caused More Rapid Improvement in Swine Than the Old System of Judging?" This was presented by Jasper Heck, in the following paper:

Mr. President and Gentlemen of the Swine Breeders' Convention: The subject assigned me by your committee is this: "Has the Score Card Caused More Rapid Improvement in Swine Than the Old System of Judging?"

We have had a standard of excellence for more than twenty years. I have not the necessary date and cannot give the exact time. The old system of judging was done under the Standard and generally by a committee of three. To show just what improvement was made during their reign and draw a pen picture of the various breeds at the time the expert judge was enthroned is a difficult matter for me to do. The score card is nothing more or less than a standard of excellence, with two additional columns to indicate the score. The expert judge is one who is expected to give his decision without the score. Now this is not a question as to which is the best system of judging, but a question of improvement and the cause. The expert judge has been at work for ten or twelve years and I shall endeavor to show some of the improvements made during this time. We will commence with one section of the score card which is common in all breeds, feet and legs, but a few years ago it was very common to see hogs with crooked legs, knock-kneed, walking on their pastern joints, with toes sprawled out. Instead of this we have a pig with straight legs, short, round pasterns, standing on the tip of his toes and not easily broken down. It is needless to say that the score card is the cause of the improvement. But how about the general improvement of swine?

The Berkshire hog of a few years ago was a medium sized animal with a fine dished face, and ears erect, short, full neck, broad, level back, heavy, square hams, with solid body color tipped with six white points; there were very many of them with white spots on body and such a thing as a swirl was unknown. But any one familiar with the best specimens of the breed to-day will recognize in them a very large boned animal, having great length and depth of body, with large ears, inclining forward, with rather rangy neck, so when head is carried low will present a beautiful curve or arch. They sometimes have a white spot on body and frequently a swirl, but their presence are somewhat modified by the superior excellence of the improved type. Now it is plain to see that this improvement, whether rapid or otherwise, has not been brought about by the score card for the reason that it does not describe this type of animal, nor the old system of judging. I should rather attribute it to the demand for fifteen-cent bacon, but neither is the cause. You will notice that the score card calls for an upright ear and a quiet, gentle disposition, a character rarely obtained with an upright ear.

If anyone will compare the standard of the Berkshire and the Poland-China breeds they will find them, with the exception of head and ear, almost exactly alike. But in the Poland-China breed, the tendency to improve has been in the opposite direction to that of the Berkshires, and instead of the large-boned, long-bodied, slab-sided, heavy-eared animal with white spots on his body, we have a medium-boned, blocky-built animal, with almost solid color, beautifully tipped with white points, whose symmetry seems to blend nicely with various divisons of the standard.

The improvement of the Jersey Red breed or Duroc-Jersey has in my opinon been more rapid within the jurisdiction of the expert judge than that of any other breed. I first noticed these hogs more particularly at our State Fair a few years ago. It was during that time that Mr. Rousch was judging, and while he was passing on this breed received a very painful wound in the leg by one of them, after which he kept at a safe distance, and I noticed he had a very large club in his hand at the time.

The males especially were very thin in flesh with crooked back and legs, and it was a difficult task to keep them in the show pens. In fact, they were such a sorry, angular, vicious looking set that one would think they were bred for no other purpose than to "outrun a nigger." They have come to the front, and to-day you will find many herds that will successfully compete with any of the leading breeds of the land. Now, what is the cause of this rapid change in the conformation of this breed? Is it the score card? It certainly cannot be the old system of judging? My opinion is, it is due to the greater margin for improvement.

I cannot, with my limited knowledge, note the improvement of all the leading breeds, but there is one, yet, that deserves a more favorable mention than the author is able to give. The Essex, this is one of the oldest and best established breeds in the country. If any animal was capable of transmitting his qualities to his offspring it was the Essex, for the little, black, sharp-nosed, fox-eared, cat-horned, sunfishy-fellows were sure to appear. But of late years and since the establishment of the score card system of judging quite an improvement is made, noticeable more especially in the "White River Herd." In this herd will be found individuals with a fine dished face, broad between the eyes, ears of medium size, with a broad, level back, carrying its width from shoulder to rump, hams broad, full and round, and but for his solid black color might be mistaken for a very respectable Berkshire of a few generations back. No one for a moment would suspect Mr. Green of infusing any Berkshire blood into the veins of his herd, for he would not accept a Berkshire as a gift. I cannot credit the cause of this improvement to the score card, for I have not been able to find one for this breed.

There was one particular animal from the White River Herd that I almost forgot to mention. She was caught in the storm at our last State Fair and escaped from the wreck unhurt, was brought round to the west end of the Berkshire row and assigned a pen where she could get plenty of air. This animal attracted more attention than any exhibit on the ground. Robert Bakewell, the originator of the Leicester sheep, and one of the most skillful and experienced breeders in the world, is said to have formed a breed of pigs, which, when fat, were nearly equal in length, depth and breadth, their belly almost touching the ground, the eyes being deep-set and sunk from fat, and the whole carcass appearing to be one solid mass of flesh. Our genial friend, Mr. A. C. Green, has broke the record of this skillful breeder and has not only produced a pig whose length, depth and thickness is equal, but one which is larger when lying down than standing up, for she spread all over the pen. The animal was put in a pen adjoining my pigs and shortly after was left to the tender mercies of the crowd, her owner having other pigs to look after. So I thought I would care for her in his absence. They wanted to see her up. I told them if they worried her she would die. They asked me all kinds of questions. I had more trouble with this animal than all the pigs I showed. They wanted to know if she had any feet, so they finally got her up. Yes, she's got feet; they look like pins stuck in a pumpkin. Has she got eyes? She looks like a bat. What breed is she? Some one read my card on the post. She's a Berkshire. I said no, the card was intended for the other pen. They repeated the question, so I tore down the card for reasons better known to myself. It is said that Mr. Bakewell left no record of his mode or principles of breeding, but it is hoped that Mr. Green will throw some light on the subject.

The next subject was, "What Were Your Observations of the Swine Interests at the State Fairs of 1897?" Joe Cunningham was assigned this subject, and he reviews his summer's troubles in the following:

"Early in the season I decided on visiting several of our leading fairs. My first fair was the Kentucky fair at Shelbyville. The attendance at this fair was very good and the swine interests were well represented. It being the largest show of hogs ever made in that State, consequently it attracted considerable attention. The quality of the exhibits was good and the Kentuckians were justly proud of them. Kentucky is not classed as a hog state, but she is rapidly falling in line, and already has a large number of the best animals and strains within her borders.

"My next fair was at Columbus, the Ohio State Fair. Here the boys were all out and the interest was fully up to past years. Old breeders said the number of hogs was not as large as in previous years, but there was considerable improvement in the quality. One very encouraging feature I observed was the increase in the number of young breeders, and the great inquiry from those who are contemplating branching out in the business of breeding swine.

At the Wisconsin State Fair I found but few hogs, especially in the Poland-China class. The majority of exhibits was largely in favor of the Berkshires and Duroc-Jerseys. The interest was very encouraging. They are just commencing in that section, but they are in earnest, and a good demand may be looked for from that State.

The Indiana State Fair was my next point of observation. This is familiar to all of you and I need not take the time trying to tell what I saw.

The next fair, Illinois, I can remember but few of you were there. My observations there were a surprise to me. The old Poland-China breed was surpassed in numbers by the Berkshire and Red Hog. and their breeders were hustling and a great demand was stimulated. The Polands had a good show, but the work seemed to center on the ribbons rather than anything else, and business was slow until after the premiums were decided. I am firmly convinced that the swine interests are on the eve of prosperous times and hope we will all be in shape to reap great benefits from the revival."

W. G. Riley: I concur in what Mr. Cunningham says about the fairs, especially the Illinois fair. I believe such a round of fairs as has been described would be of great interest and benefit to any who would take it, and really more of us should take these trips. A visitor to a fair having no other business than that of studying that which he sees, mixing with the exhibitors and other visitors, examining the stock, etc., will certainly learn much that cannot be obtained in any other way.

The next subject, "Outlook for Improved Swine in Southern Indiana," was allotted H. F. Work, who was absent. Mr. Hobbs, Salem, Ind., presented the subject as follows:

There has existed within Indiana and other States a prejudice against Southern Indiana in a great many ways. Probably this is due to the Eggleston style of literature, which has been the only introduction many have received to Southern Indiana; be this as it may, the Southern Indiana of to-day is quite different from that of a few years back. Many rapid, important and lasting improvements have taken place there, within a few years. It has been discovered that our rolling lands are especially adapted to hogs; that hogs are less liable to cholera; that the climate is agreeable to them; that hogs can consume surplus fruit, etc., to good advantage. The Farmers' Institutes have been introduced within Southern Indiana and they have sown seed that is producing a wonderful harvest. Within the past two years many fine herds of hogs have been introduced into Southern Indiana. Their owners have demonstrated their ability to raise the best and their efforts have been rewarded by a good demand from their own section of Indiana, and from Kentucky. This is stimulating others, and I predict that in a few years, as far as the hog interests are concerned, no distinction can be made between Southern Indiana and any other part of our great State.

Dr. Collins: I have been attending the Institutes in Southern Indiana for the past two or three winters. I never attended more interesting Institutes, or met with people so eager to learn. They were greedy for information, and if you would you could talk all the time. If our breeders will cultivate that section, show a willingness to answer their questions, fully and promptly, I believe great benefits would result.

On motion, the Association adjourned for supper to meet for the evening session at 7:30.

EVENING SESSION.

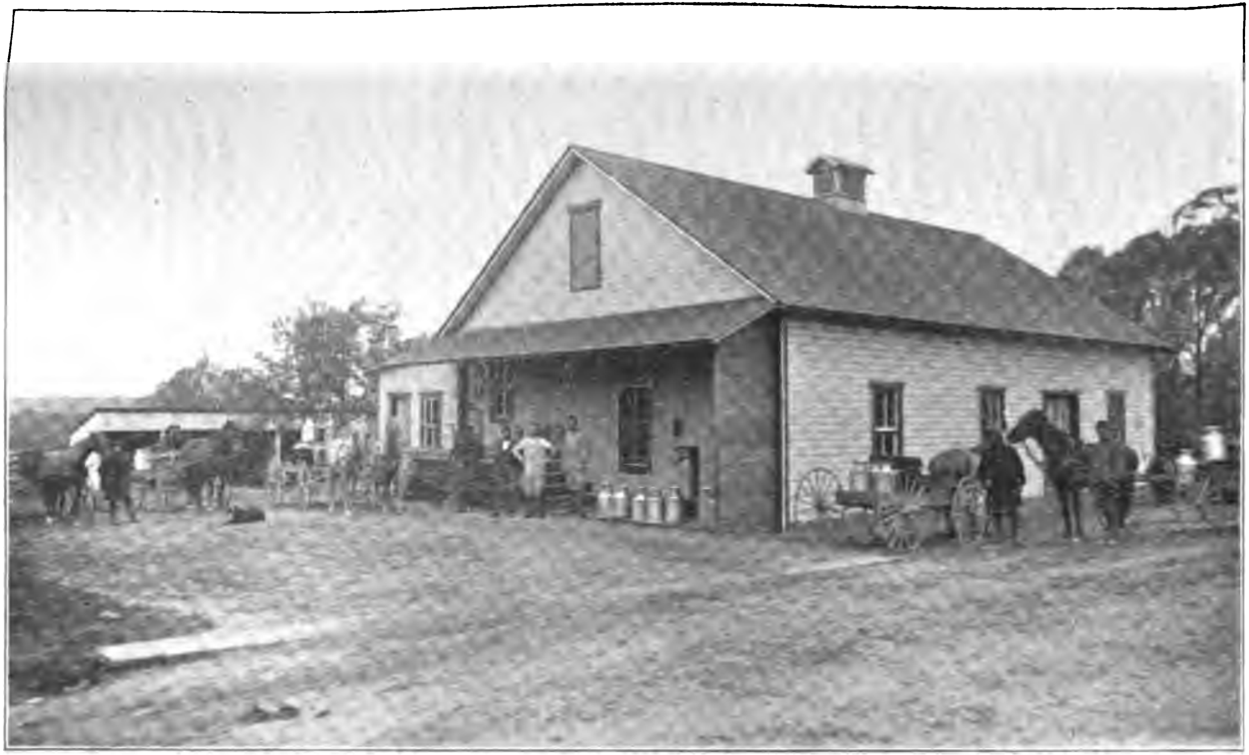
The first subject was "Fecundity of Swine," presented by Dr. A. W. Bitting, of Purdue University.

The remainder of the evening was passed in discussing the several questions taken from the "Question Box."

The meeting concluded with the election of officers, as follows: President, E. M. C. Hobbs, Salem, Ind.; Vice-President, L. L. Moorman, Winchester, Ind.; Secretary, Allen Beeler, Liberty, Ind.; Treasurer, A. S. Gilmour, Greensburg, Ind.; Executive Committee: Henry Oilar, Russiaville, Ind.; J. Cunningham, Loree, Ind.; Dr. Collins, Carmel, Ind. Committee on Program: Allen Beeler, Liberty, Ind.; E. K. Morris, Indianapolis, Ind.; L. L. Moorman, Winchester, Ind.

It was announced that the Indiana Expert Association would hold its winter meeting at Purdue University, Lafayette, Ind., on the first and second days in February, 1898. All are invited and preparations are being made for a grand time.

On motion, the Association adjourned.



THE CENTERVILLE CREAMERY, CENTERVILLE, INDIANA.

EIGHTH ANNUAL REPORT

OF THE

Indiana State Dairy Association.

ANNUAL MEETING

HELD AT

Lewisville, Henry County, December 29-30, 1897.

OFFICERS AND MEMBERS OF THE INDIANA STATE DAIRY ASSOCIATION FOR 1898.

S. B. Woods, President, Lottaville, Lake County.
O. P. Macy, Vice-President, Mooresville, Morgan County.
C. S. Plumb, Secretary-Treasurer, Lafayette, Tippecanoe County.

EXECUTIVE COMMITTEE.

S. B. Woods. O. P. Macy. C. S. Plumb.
J. J. W. Billingsley, Indianapolis. W. S. Commons, Centerville.

MEMBERS FOR 1898.

Andrews, B. F., Greenfield.
Banks, N. P., Hobart.
Barnhart, John H., Logansport.
Bartlett, Wm. M., Lewisville.
Bates, A. H., Arcola.
Batterman, H. A. Brunswick.
Baum, H. M., Frankfort.
Beane, John, Richmond.
Beckman, H. C., Brunswick.
Beckman, J. N., Brunswick.
Benjamin, C. B., LeRoy.
Billingsley, J. J. W., Indianapolis.
Blue River Creamery, Knightstown.
Bollmeyer, J. F., Lewisville.
Boyd & Drichel, Cambridge City.
Boyer, Samuel, North Manchester.
Bracy, E. L., Chicago, (Ill.)
Bradford, I. H., Bridgeport.

Brown, D. M., Lewisville.
Butler, Leeburn, Lewisville.
Carter, S. M., Plainfield.
Centerville Creamery, Centerville.
Cochran, M. B., Hanover.
Commons, E. L., Richmond.
Commons, J. A., Centerville.
Commons, L. D., Centerville.
Commons, W. S., Centerville.
Comstock, Harry J., Greenfield.
Cope, D. J., Lewisville.
Cox, B. G., Terre Haute.
Cox, Erwin, Westfield.
Cripe, Henry, North Manchester.
Dahl, Fred. H., Lowell.
Dungan, S. O., Indianapolis.
Fansher, W. D., Lewisville.
Farmer, A. W., Mooresville.
Furness, E. L., Furnessville.
Gardner, W. G., Wabash.
Gilbert, Abel, New Lisbon.
Gilbert, J. J., Lewisville.
Guenther, Louis, Evansville.
Hack, John, Crown Point.
Hacker, Prof. T. L., St. Anthony Park.
Hadley, C. R., Bridgeport.
Hadley, W. H., Bridgeport.
Hall, Frank, Lewisville.
Hall, Luther G., Straughn.
Hall, Wm. C., Lewisville.
Hanning, Edwin F., Evansville.
Harmon, May, Greenwood.
Harris, L. B., Centerville.
Harvey, J. H., Carmel.
Heacock Edgar, Lewisville.
Hickman, Willard, Springport.
Hilfiker, J. H., Westville.
Hoadley, Arthur, Ockley.
Holloway, Silas, North Manchester.
Husselman, Cal., Auburn.
Isenhour, J. E., New Augusta.
Jackson, C. B., Centerville.
Jackson, Thomas J., Centerville.
Jenkins, E. H., Indianapolis.
Jessup, George, Plainfield.
Johnson, D. B., Mooresville.
Johnson, F. P., Howlands.
Jones, Frank L., Utica, New York.
Knox, J. M., Lebanon.
LaGrange, J. W., Franklin.
Levering, Mortimer, Lafayette.
Lisman C. W., Carlisle.
Macy, O. P., Mooresville.
Manlove, Geo. W., Lewisville.
Martin, J. R., Lewisville.
Martin, T. J., Lewisville.
Meyer, Otto A., Cedar Lake.
Meyer, W. V., Lewisville.
McCain, Wm., Hortonville.
McIlvaine, A. P., Lewisville,
Miars, L. M., Bridgeport.
Mills, A. H., Mooresville.
Mills, D. D., Bridgeport.
Mills, Elwood, Bridgeport.
Mills, O. H., Mooresville.
Moore, J. S , Plainfield.
Newby, Herbert, Spiceland.
Newlin, Calvin, Plainfield.
Nichols, C. E., Lowell.
Nugen, T. S., Lewisville.
Pavey, Mrs. J. S., Lebanon.
Payne, Nathan, New Castle.
Peed, E. H., New Castle.
Penn, B. A., Logansport.
Plumb, C. S., Lafayette.
Pottschmidt, F. H. W., Tampico.
Raab, Peter, Brightwood.
Reeves, Horace, Friendswood.
Richardson, O. J., Lewisville.
Roberts, Austin, Westfield.
Roberts, William H., Howlands.
Rohe, John W., Centerville.
Rotermund, H. F., Bemes, Illinois.
Russell, William, New Palestine.
Schmal, Alf., Brunswick.
Schwegler, W. G., Lafayette.
Scott, D. W., Sugan.
Shafer, T. A., Hagerstown.
Shugart, J. N., Marion.
Smith, D. C., Lewisville.
Stanley, Elmer, Plainfield.
Stubbs, O. A., Lewisville.

Sudendorf, Edward, Elgin, Illinois.
Symons, L. F., Lewisville.
Tappan, Geo. L., Liberty.
Thomas, L. W., Elizabethtown.
Taylor, S. J., Logansport.
Van Arnam, M. F., Chicago, (Ill.)
Van Norman, H. E., Lafayette.
Vestal & Sons, Plainfield.
Ward, A. F., Thorntown.
Welborn, J. M. T., Bridgeport.
Wiggam, C. M., Vernon.
Woods, S. B., Lottaville.
Wright, I. N., Lewisville.
Wright, W. J., New Castle.
Yoars & Son, P. G., Amboy.

LIFE MEMBER.

T. E. Ellison, Fort Wayne.

HONORARY MEMRERS.

His Excellency, Hon. J. A. Mount, Governor of Indiana.
J. H. Monrad, Winnetka, Illinois.

Active Members	125
Life Members	1
Honorary Members	2
Total	128

COUNTIES REPRESENTED.

Allen.
Boone.
Carroll.
Cass.
Clinton.
DeKalb.
Grant.
Hamilton.
Hancock.
Hendricks.
Henry.
Jackson.
Jefferson.
Jennings.
Johnson.
Lake.
LaPorte.
Madison.
Marion.
Miami.
Morgan.
Porter.
Sullivan.
Tippecanoe.
Union.
Vanderburgh.
Vigo.
Wabash.
Wayne.

Counties represented, 29.

ARTICLES OF ASSOCIATION OF THE INDIANA STATE DAIRY ASSOCIATION.

(As Amended January 3, 1893.)

Article 1. The name of this Association shall be "The Indiana State Dairy Association."

Art. 2. The officers of this Association shall consist of a President, Secretary-Treasurer and Vice-President, and an Executive Committee, consisting of the President, Vice-President, Secretary, and two others elected by the Association. A committee of two, to audit the Secretary-Treasurer's accounts shall be appointed by the President at each annual meeting.

Art. 3. The officers shall be elected to serve one year, or until their successors have been elected.

Art. 4. The regular annual meetings shall occur at such time and place as may be designated by the Executive Committee.

Art. 5. Any person can become a member of this Association for one year by the payment of a fee of one dollar. Upon the payment of ten dollars a person may become a life member. Honorary members not to exceed five may be elected, but said election is not to hold for over two years, excepting by re-election.

Art. 6. The President shall have power to call a special meeting at such time as in his judgment the interests of the Association demand.

Art. 7. The Executive Board shall have power to transact all unfinished business.

Art. 8. The Treasurer shall be the custodian of all the funds belonging to the institution, and pay out the same on the order of the President.

Art. 9. The officers of this Association shall perform such duties as usually devolve upon officers of similar organizations.

Art. 10. The President and Secretary shall each be allowed out of the general fund an amount equivalent to their actual expenses while attending Association meetings.

Art. 11. These articles may be amended by a majority vote of the members of the Association present.

Note—At the 1897 meeting at Lewisville, the Secretary was voted authority to appoint an Assistant Secretary, who should help him in his duties, especially at the annual meetings.

INDIANA STATE DAIRY ASSOCIATION.

The Indiana State Dairy Association was called to order by President O. A. Stubbs, there being an audience of one hundred present. After prayer by Rev. R. A. Watson, the Association was welcomed to Lewisville and Henry County by Mr. T. S. Nugen, as follows:

Mr. Nugen: This is something new to me. I have never appeared before an audience for this purpose before. Like a great many others who are here, I am interested in the farming business and in the dairy business to some extent. We, as citizens of this community, esteem it a pleasure to welcome the strangers that are here to that which we have. We wish you all to know that our latch-string hangs on the outside. I have seen a statement in one of the journals of the State saying that it was a mistake to have a State organization like this meet in such a small place as Lewisville. It may be in some particulars, but we desire to prove ourselves worthy of this organization; we want to show you that we can entertain you right. We expect to hear discussions here that will be of benefit to us. We thought of this when we invited you to meet here. and to this extent we may have looked at it in a selfish spirit. I think if the editor of the paper I have alluded to were here, and if some of us would take him to our homes and entertain him. that he would come to a different conclusion. It isn't always the largest man that can do the hardest fighting, and it isn't always the largest town that can do the best job of entertaining.

As a community. we are interested in this organization. and in laws that will tend to bring about a production of wholesome and pure food. and which can best be brought about by such organizations as this. There is no doubt but what tne communities in different States are deriving a benefit from organizations such as this. I am sorry to confess that I am afraid Indiana is behind many of her sister States in this respect. I notice that Illinois has passed a law that they can not sell oleomargarine. imitating butter. in that State any more. I think we ought to have such a statute in Indiana to protect the interests of the people. I believe that such organizations as this will bring that about, and I think. too. that it doesn't only require an organization in each State, but that it requires a national organization as well. I think if we had a national organization that our foreign trade would be better in the products that we manufacture. I notice that the Secretary of Agriculture has been trying to introduce our butter into foreign markets. I do not believe that even that can be done until every food that is manufactured in this country shall be branded as it really is. I believe that would establish confidence, and I believe that confidence establishes a profit, and that every member of society will reap a benefit from that kind of legislation. Products of Indiana in foreign markets are not known as such; they are simply known as "Products of America." I think we should have a law to punish the manufacturer of an impure food article for his skulduggery, and I think a national organization will tend to bring about this result. I think an organization like this should be formed in each State of the Union, and then have a national association formed from that, and then we would get the right kind of legislation.

Wm. C. Hall, of the local committee on entertainment, informed the convention as to the arrangements that had been made for their entertainment, and in speaking of Indiana

Mr. Hall said: Mr. Nugen says that Indiana in some respects is a little short of some of the other States. I have read Prof. Plumb's address in the last year's proceedings of the State Dairy Association, and while every word of it is true, still it doesn't speak in as complimentary a manner of our great State as I think it ought to. Now, I am a Hoosier, born here. I am for Indiana first. I don't believe there is any other State that is better than Indiana for anything. That is about the way I look at it. [Applause.] Indiana is compared to the other States, and no allusion whatever is made as to the comparative sizes of the different States, nor the population, comparatively speaking. We are, comparatively, a small State. Indiana has about twenty-two million acres of land; Ohio has twenty-six million acres; New York has thirty-one million acres; Iowa and Illinois have each more than thirty-five million acres. You see, they are almost twice as large as we are: Ohio is twenty per cent. larger than we are, and New York perhaps forty per cent. Kansas has probably fifty-two or fifty-four million acres; it would take two and a half States like Indiana to make one Kansas. California has more than one hundred million acres, equal to four and one-half States like Indiana. Take our hog industry, or wheat industry, or almost any of our leading industries, and compare Indiana with these other States I have mentioned, and the ratio of our area and our size, and we lead every time. Now, back in 1872, we had a wonderful wheat crop! forty bushels to the acre was common, but we compared our wheat crop that year with the wheat crop of California for that year, without taking into consideration our much smaller acreage. We are only just a little bit behind California as it was, and California four times as large. Compare us rightly, as we should have been, in the ratio of our size and population, and we just "skunked" two or three States like California. [Laughter.]

It is the same way with our dairy business. Of course, there is Wisconsin, and some others of our dairy States, that are ahead of us, but the comparisons are never made fairly at all. We just happen to be a little bit smaller than some of the other leading States, and we will have to contend with it. Take the location of Indiana, and we are fortunate. Take our network of railroads, and there is nothing like it in the United States. Take our natural gas and our oil, our coal and minerals, our manufactures, our agriculture and horticulture, our transportation and our commerce; take all our interests combined, and we make a most excellent showing. Take our public school system; it is the best in the United States. We have the most efficient teachers, and we have a great many things in which we are leading. Take Indianapolis, and it is the greatest inland city on the globe. I do not mean that you can compare Indianapolis with London and with Chicago and Philadelphia, but I am speaking about an inland city now, one that is not affected by water transportation at all, nothing but railroads. Indianapolis in this respect is the greatest city on the globe.

Mr. C. B. Benjamin, of Leroy, Lake County, responded on behalf of the Association, as follows:

Mr. Benjamin: Our presence here to-day is significant of the fact that this Association is worthy the attention of all up-to-date dairymen of Indiana.

Our purposes are to make it the "sweet song" of the modern dairyman or woman who has the courage to meet with us, thereby showing the tie that binds us to the one great goal upon the ladder of success. There are among us those who have made some little sacrifice to be present, and may God grant that their cups be filled to overflowing with the meats of this convention.

Having assembled in honor of the dairymen of the great State of Indiana, who have heeded the call, and by their presence are availing themselves of an opportunity to gain more knowledge, and learn how to obtain more butter-fat from the products of the soil of our State, we deem it wise and good husbandry to come together in this rustic town of Lewisville to compare ideas upon the perplexing questions confronting the average dairyman of to-day, and to further acquaint ourselves with the dairymen and women of this (Henry) county, who, by their sterling worth and integrity, have gained a foothold in the dairy world, not easily uprooted, doing business as more of us should, doing it themselves. We are here to listen with eagerness to all subjects likely to come before us. for we present a program second to none as regards both foreign and local talent. To discuss all subjects to the point is also our duty, not forgetting we are the people of to-day and to-morrow here assembled. We want to most earnestly thank the members of our last General Assembly for the financial aid given this weak sister, calling itself the Indiana State Dairy Association, for now we can hold up our heads and ask in our neighbors without fear of embarrassment. We would call your attention to the fact that if we want any laws equalizing our rights and favoring national prosperity, we should cast our ballot for the man who is above reproach, the man who scorns knavery, the man of ability to make good milk, instead of the city politician who happens to get the nomination, and, after election, refuses your presence, because, perchance, you smell of the cow. May the day not be far distant when the man who handles the cow will see that he himself is in part to blame for letting the other fellow sit upon the throne while he trudges on in the sultry and narrow way that terminates in poor milk, bad butter, and poverty.

Now, in behalf of the Association, and before closing, we want to thank the professors of other States and of our own, for their presence and assistance in lending a helping hand in making this, our eighth annual convention, a success. Especially do we thank the people of Lewisville and vicinity for their hospitality which we are preparng to enjoy, and for their labors in preparing for this meeting. We sincerely hope that this convention may lend a strengthening hand to the dairy interests of this locality, and that henceforth her dairymen may work together, for "in union there is strength," even in the dairy business.

Secretary-Treasurer C. S. Plumb read the report of Mr. H. C. Beckman for the meeting of 1896, at Lebanon, after which he made a report as Treasurer, which was referred to an Auditing Committee appointed by the President, consisting of W. S. Commons and S. B. Woods. Before giving his report, the Treasurer made the following remarks: I will first state, as some of the older members know, that this Association never had any revenue, except that which it has secured from the annual dues of one dollar each, and from advertisements that were inserted in our annual reports. In spite of this, we have published each year a stenographic report of the proceedings of the State Dairy Association. Fortunately for us, at the last session of the Legislature, that body was good enough to make us an annual appropriation of $500.00 a year, for two years, and, therefore, it is necessary to make two different reports to this Association. The Dairy Association has an indebtedness of something over one hundred dollars that cannot be paid out of the State appropriation. We must go at it energetically and remove this indebtedness. The only way it can be removed is by means of the annual dues, and in that way we should be able to stand clear and go ahead on our State appropriation independently. While we have paid no salaries, it has been customary now for some years to pay the traveling expenses and hotel expenses of the President and Secretary-Treasurer attending the annual meeting, and to meet the expenses of the Executive Committee, where it is necessary to get together and transact the business of the Association. Our annual report may be printed by the State printer. We have not spent all the five hundred dollars from the State, and the remainder will be used to meet our running expenses for 1898.

Pres. Stubbs: We will now listen to the first address on the program, which is

BUTTER-MAKING IN THE FARM DAIRY.

BY GEORGE S. TAPPAN, LIBERTY, IND.

Butter-making, whether carried on in the creamery or in the dairy, needs the closest attention of those connected with it. It cannot be carried on in a haphazard way, but must be taken along a certain line, with the special aim in view of reaching the top, and gaining a reputation. We must remember that there is great competition in the butter business, and keep our eyes open to the demands of the public, as our customers, and cater to their demands as near as possible.

The butter business is one of the greatest remunerative businesses of the day, if properly conducted, and there is no reason why the American people cannot supply the demands of our own country with first-class butter, and do away with the various imitations that are doing our own interests so much damage, both at home and abroad. If managed on a right basis, farm dairying will be one means to get rid of these impostors, and establish a reputation as butter-makers for our farmers, which will cause a demand for their product, and in time there will be nothing but good butter offered on the markets.

Now, the question is asked: What facilities must we have and how must we conduct the business to gain this end? First, we must have a good herd of butter-producing cows, and in buying a cow the only way to find out her value, is to apply the Babcock test to a portion of her milk, to determine the amount of butter-fat therein. Then we can tell whether she is worth paying a good price for, or whether she is dear at any price. Then we must know how to feed and manage these cows, so as to get the best results from our investments. The cow is a machine for manufacturing our coarse fodder and grain into milk. This machine requires a certain amount to keep it in running order, and our profit comes from what she consumes after she has taken care of herself. A food may be so lacking in palatability and digestibility that the cow will only consume enough to sustain herself, in which case our profit is a minus quantity. Then we must find a food that will make us a profit, and to do this we must know the value of our feeding stuffs, so as to get a full or balanced ration for our cows. A ration furnishing the protein, fat and carbohydrates in the right proportion, is said to be a balanced ration.

In addition to furnishing the requisite amounts of nutrients, the food must have a certain bulk. This bulkiness is brought about by feeding a certain amount of roughness, which aids digestion, and helps to keep the animal satisfied and healthy.

We must not neglect the barn where our cows are to be kept. We must, then, have a roomy, well-ventilated stable, and be sure to keep it clear from filth or odors. We know that milk is one of the greatest sources of disease, and the bacteria which cause disease are on the cows and in the foul air connected with an unclean stable.

Then comes the milking of the cow; concerning which I quote the following from the National Stockman and Farmer:

"A good milker riseth up in the morning, and the morning after it is the same hour, and even on the Sabbath day he sleepeth not late, but goeth at the appointed hour to milk the kine.

"He washeth his hands, yea, he washeth them clean, and he also taketh a cloth wherewith to cleanse the udders of the kine.

"And when he goeth into the stable he closeth his mouth, and he openeth it not again until he cometh out, save to say, 'So Boss.'

"And when he cometh to the skittish heifer, he handleth her teats with care, and pulleth them gently until the milk flows therefrom, and the heifer rewardeth him by standing as a tree planted in the ground.

"And he keepeth a cover on the can, and when he poureth the milk thereto, he carefully covereth it again.

"And when he sitteth down and begins to milk, he getteth not up until he hath gotten it all, yea every drop, for he knoweth that though he doeth all things and doth not this, it profiteth him nothing. Yea, though he speaketh to the cow with words sweeter than the honey and honey-comb, and getteth not all the milk, he is an unprofitable milker."

Then comes the care of the milk after milking. We should have a milk-room separate from our living apartments, and be sure to keep it clean and well ventilated all the time. We also should have a pair of scales in the milk-room so as to weigh the amount of milk we have, and then weigh our cream. By this method we can keep a strict account of all our milk and cream.

We know that a separator is indispensable in this room, and so also is a cooling-vat or tank, through which cold water runs, so as to cool our cream down to the desired temperature, say of forty-five degrees, if kept two or three days. We should then have a small ripening vat, which is much nicer than ripening in cans, and be sure to have a good thermometer, so we can know exactly what temperature our cream is. If the cream is kept in a ripening vat, and a uniform temperature maintained for twenty-four hours, it is then just right to churn. The churning temperature depends on the judgment of the operator. Ordinary cream, properly ripened, should be churned at from fifty-six to sixty-two degrees, according to size of churn and temperature of room. The temperature of the churning room should range from fifty-five to sixty-five degrees, and the churn should be allowed to stand in this room a few hours before using. Before using the churn and all other woodenware, they should be scalded and thoroughly cooled, so as to prevent butter sticking to them. Then we pour in our cream and begin to churn. All forms of churns having a dasher or beater to stir or beat the cream, have been condemned. It has been found that this kind spoils the grain of the butter. Patent minute churns come under this head. Any kind of churn which produces the necessary kind of concussion by the cream being thrown against a smooth surface, may be safely used. This includes such forms as the barrel, box, rectangular, swing and disc churns. The time taken for churning depends on the temperature and acidity of the cream. When done churning, the butter should be in nice granular form, about the size of a grain of wheat. Then we draw off the buttermilk, and wash the butter once or twice with pure cold water, being careful to leave the water in only a short time, as water injures the flavor of the butter. We then transfer the butter to the bowl, weigh it, and add an ounce of salt to every pound of butter, which should be worked thoroughly therein, leaving it in a cool place to be worked again in a couple of hours. Be very careful to not work the butter too much, as it injures the grain, and more butter is injured by too much working, than by its not being worked enough. Now, we take a sample of buttermilk and apply the Babcock test, to see if we have lost any butter-fat, or have had an exhaustive churning.

We now return to our butter, rework it, and print it into brick forms, with our initials, or the initials of the dairy printed upon it, and put it away in the cooler, or in the shipping box for our customers. Here we find the finest lot of dairy butter to be had, and a sure cure for users of those unpalatable imitations, which it is our aim and purpose to extinguish from the American markets.

DISCUSSION.

C. B. Benjamin: I want to ask Mr. Tappan why he works butter twice; why doesn't he print it right away after he takes it out of the churn?

Mr. Tappan: Some people prefer working it once, but as a rule the dairy farmers prefer working it over a little at first and let it stand a couple of hours, and be sure the salt gets clear through the butter, and then work it over the second time and then print it. I think, in that way, you get better butter. I think that more milk and water is worked out in that way.

Mr. Benjamin: Don't you find that it is an extra amount of work to work it over the second time? You say you let it stand and cool. Don't you find it stiff and hard to work the second time?

Mr. Tappan: Sometimes in cool weather it is, but with very little working it is all right; with these butter-workers you can work it over very easily. If you have it in a bowl and work it over you will find it hard work, but with a hand-worker it is not very hard work.

Mr. Benjamin: I would like to ask if you wait until you take it out of the churn before you salt it? Why not salt it when it is in granular form in the churn. We find that we can work the salt in better and more thoroughly in that way than by salting it after it comes out.

Mr. Tappan: I never tried that, but I think it would be difficult that way to get the proper amount of salt in the butter. In taking the butter and weighing it you get the exact amount you want in the butter.

Mrs. Caroline Edgerton, of Henry County: The thought has occurred to me about the butter being too hard to work; it would not take long for a person to learn to keep it in a place where it would not be too hard. (Applause.)

Silas Holloway, of North Manchester, Wabash County: I am not a farm dairyman or a butter-maker; I am a creamery man. I used to work butter twice, always, but of late years I have been only working it once, from the fact—not but what I believe twice is better, if all the circumstances are favorable—that I have adopted the plan of working it once because then the butter is in very good condition to work; it is neither too cold nor too warm. If you let it lie in the summer time, in all probability it will be too warm, even if you put it in a refrigerator, and in the winter time it is very apt to be too cold to be the best for the grain of the butter when worked, and for that reason I have concluded the better plan is only to work it once, but in other ways I think twice working it is better because it gives a better opportunity for the salt to work through. In the creamery, of course, oftentimes you have too much to do to work it twice, and you must necessarily, oftentimes, leave it until the next morning, and then it is liable to be either too cold or too warm. For that reason, I believe, taking it all around, it is preferable to work it but once, and pack it right down.

Prof. Smith, of Agricultural College, Michigan: I have made a good many pounds of butter on the home farm, and I am rather inclined to believe, with Mr. Tappan, it is a good plan to work the butter twice. Streaky butter depends to a large extent in getting the salt unevenly distributed through the butter. In order to avoid that I want the butter worked pretty thoroughly—but not overworked. You must have a good place to keep the butter, and have it of the right temperature, when you work it the second time. If you haven't a good place to keep the butter, you had better finish working it the first time. That is my experience, and so I agree with both.

Mr. Walker: Do you lay all the streakiness to salt in the butter?

Prof. Smith: I believe that is the main cause of the butter being streaked. I do not mean spotted. The main cause of mottled butter is the uneven distribution of the salt through it, and I believe you can better secure a better distribution of the salt by working it twice, but if you haven't a real good place to keep the butter, I would not work it twice.

Mrs. Caroline Edgerton: You cannot work butter when it is warm without ruining it. You must have it in a cool place, or you had better not work the butter at all.

John Marts, New Castle: I am inclined to think, from my experience, that butter should always be worked twice. We invariably work our butter the second time. We take it and weigh it, and work a little salt into it, and set it aside, and let it remain long enough for the salt to soak through the butter. It is necessary to keep it in a place of the right temperature; if anything, it should be a little too cold. It may make it harder to work, but it can be worked and got in the right shape. I think it should always be worked the second time.

Mr. Benjamin: In salting the butter in the granular form, and draining off the brine, you get it thoroughly mixed with the salt, and this, I claim, will prevent streaking. Now, if one working will do, and if by one working you can work off all the surplus brine, why work it twice? God knows there is enough work about it anyway, both for women and for men. If one working will do, why work it twice? In regard to contamination by bad odors, eight times out of ten this is from cooking odors that pass through the houses on the farms. We can make just as good, if not better butter, by working it over once, and pack it, and thus get it ready for the consumer.

President Stubbs: We will now take up the next topic on the program, which is entitled:

MY EXPERIENCE WITH A STAVE SILO.

BY J. J. W. BILLINGSLEY, INDIANAPOLIS.

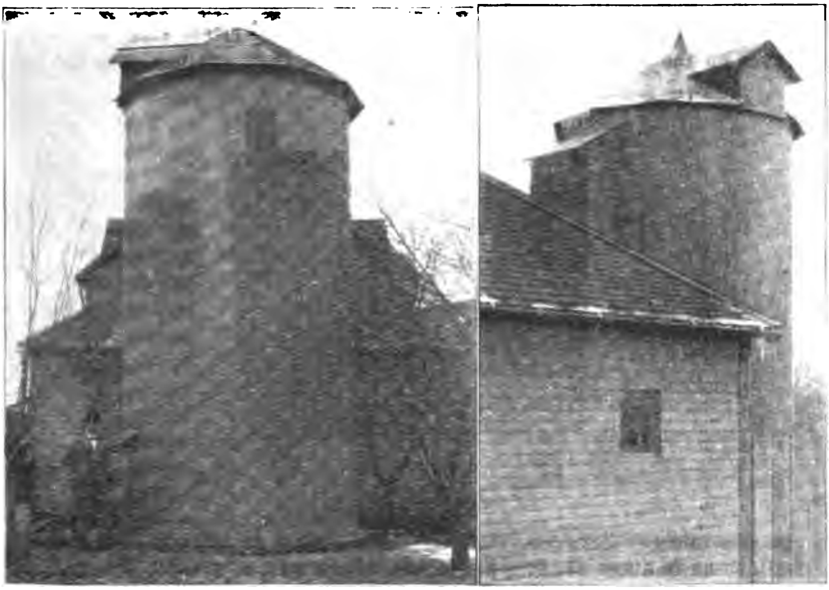
We have had a square silo in use for three years past, and have filled it again this year, but with our herd of twenty cows, and some young heifers, it does not hold enough to feed our stock through the winter months, in consequence of which we determined to build a stave silo, with the following results:

Size, ten feet six inches in diameter, outside measurement; height, nineteen feet.

We contracted with a planing mill company to select yellow pine, clear of knots, size 2"x6", twenty feet in length. The pieces were planed, making both sides smooth, and the edges were center matched, with the inside surface one-sixteenth of an inch narrower than the outside, so as to form the circle when set up.

The Foundation.—We drove a stake into the ground for the center of the silo, leaving the stake to project above the ground about eight inches; then finished the top of the stake so as to allow a board with an inch hole in one end to fit on the top. Five feet and ten inches from the first hole in the end of the board, we made another inch hole, through which we passed an old broom handle, sharpened at one end, and inserted far enough to make a mark on the ground. With our last stake, we inscribed the circle for the outside of the wall. Then using another hole, we inscribed the circle for the inside of the wall. The excavation for the foundation was then made to the depth of ten inches, throwing the loose earth on the inside.

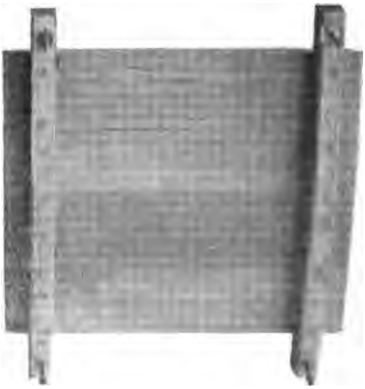
The wall was built up to the height of fifteen inches, the brick being laid in mortar of equal parts of cement and common lime, with the usual proportion of sand. After building the wall, the earth on the inside was leveled down and packed firmly and concaved about four inches to the center, leaving the wall about four inches higher than the earth joining up to it, on the inside.



A Stave Silo. Fig. 1.

Setting the Staves.—With the staves at hand we began the work of setting them. First, the staves were squared at both ends, making all of them of equal length, after which five of them were laid on trestles evenly and three lines scribed across them, a line two feet from each end.

and one midway between the top and bottom. The staves were parted, and half-inch holes were bored into the edges opposite to each other under the scribe marks, excepting the outer edges of the outside staves. Then with the use of the dowel pins, we drove the staves up closely together, and then stood the five staves on end on top of the wall and tacked on braces so as to secure them firmly in position, after which we added one stave at a time until the tub was complete. We used only a tall step-ladder to fit the upper end of the staves, the work in most part being done on the inside of the circle. At first common plaster laths were used for cleats at top, center and bottom, to hold the staves in position, but we found that we could not form a circle and hold the staves in place. We then tried flour-barrel staves split in two pieces, and the bulge of the staves fitted them exactly for forming the circle. After this, no trouble was experienced in progressing rapidly with the work, fastening each stave securely in position by tacking three lines of cleats made of barrel staves on the inside, one line near the bottom, then another near the top and one midway between. The silo staves were set on top of the circle wall, so as to allow about three inches of the wall to project outside, and about the same on the inside.


Silo Door. Fig. 2.

Hoops.—The hoops for the silo are one-eighth inch thick by three inches wide, iron, with half-inch stirrup connections fitted on the ends of the bands, and a six-inch screw thread cut on the end of the stirrups. The method of securing and tightening the bands, using a four-by-four oak piece set perpendicularly on the outside of the tub, through which the ends of the bands are fastened and tightened is shown in Figure I.

The bands were easily placed in position and the silo staves driven up closely together, after knocking off the cleats on the inside.

Openings.—In setting the staves when the side was reached, where it was desirable to have openings through which the silage might be thrown out, one of the staves was sawed into at the top and bottom of the intended openings, and the tongues of the match trimmed off on both sides, so that when the staves were set up a saw might be inserted to cut out the doors, sawing at an angle that would let the pieces of cut staves come out readily.

Figure 2 illustrates one of the doors which fits into the openings. In filling the silo, tar paper was tacked on the inside of the doors to exclude the air. The bottom of the silo was covered over with sand to the top of the wall, and then coated with cement so as to back up against the wall, a height of two inches or more, the entire bottom being concaved.

On the outside of the silo the earth is banked against the brick wall to the top, and a coat of cement backed up against the staves on the top of the wall on the outside, the same as on the inside.

Roof.—The silo is covered with a shingle roof. We might have made a flat roof, using tar paper, for less than half the amount the shingle roof cost. We prefer the latter for the reason that it is more durable, and in better taste with the other buildings. The cost of constructing a silo figures up as follows:

Yellow pine staves, 1,300 feet, $25.00 per M	$32 50
500 brick, lime, cement, sand and labor	6 00
Six iron bands, ⅛x3, complete	8 85
Carpenters' work, $1.75 per day	5 00
Nails, bolts for doors and extra labor	2 00
Coat of paint	2 00
Shingles and lumber for roof	5 00
Total	$61 35

This silo is estimated to hold twenty-five tons of silage when settled, costing $2.45 per ton capacity.

A larger silo will cost much less per ton capacity. For instance, we estimate that a silo sixteen feet in diameter and twenty-four feet high, will have a capacity of ninety-six tons, and will cost about one hundred dollars. A silo 18 feet in diameter and 24 feet high, will have an estimated capacity of 120 tons, costing about $120, or one dollar per ton capacity.

Filling the Silo.—We had contracted with one of our brother dairymen to cut and fill our two silos from the 5th to the 10th of September, our usual time of filling. The extreme drouth, however, came before he was ready; and in five days' time the corn fired half way to the ears, and was dry enough to put into shocks when the silos were filled.

In the past, we have found it difficult to get the men working on the silo to distribute the cut corn evenly; the heavy cuttings falling in the center, or to the point where their weight carries them, and the lighter cuttings working off to the sides. Unless the packing is even and alike all over, the silage will settle unevenly after the silo is filled, and damage towards the top, especially at the corners, in square silos. To overcome this trouble we took gunny bags and ripped open the bottom and basted the ends together, making a continuous bag, without a bottom, the depth of the silo (19 feet), which when fastened over the end of the elevator, conveyed the cuttings, light and heavy, through the sacks to the bottom of the silo. A man or boy can carry the bag chute around and deliver the heavy and light weight cuttings evenly. As the silo fills up rip off a sack, and in this way the silo was filled to within four feet of the top. After filling, the silage was allowed to settle two days, and it was then leveled and tramped firmly on top, and allowed two more days to settle, but did not settle more than two or three inches. It was then covered with tar paper, lapping the strips about half way, afterwards covering the paper with inch boards, joined closely together.

Breaking the Seal.—On the first of December, the seal of the stave silo was broken. We found the silage good to within six or eight inches of the top, in the center of the silo, rounding off to sixteen inches on the sides. After using about two feet of the top we found the silage good to the wall, and it continues so far as we have fed down, having at this writing fed quite half way down. We are well pleased with the result.

Mr. Woods: Give us an illustration of the door; I understand it is a very particular piece of business to get the door right.

Mr. Billingsley: There is a cut which goes with the paper which illustrates the door exactly. [See Fig. 2.]

Mr. Payne: How many years have you used this silo?

Mr. Billingsley: Only this year, the stave silo; I have used the square silo four years.

Mr. Payne: How long do you think the stave silo will last, made out of pine?

Mr. Billingsley: I don't see any reason why it mig htnot last ten or a dozen years, because as soon as emptied it will be dry and sheltered and in good condition. It is painted on the outside, and I shall put coal tar on the inside after I take out the silage.

Mr. Payne: Is that silo inside or outside of a building?

Mr. Billingsley: Outside.

Mr. Payne: Don't you think the sun will dry this pine and it will open out during the summer season.

Mr. Billingsley: I think it will; I thought before filling it next year that I very probably would fill it with clover hay; I would like to try that; I have had it in mind and may do it. If I do not I think I will give it a coat of coal tar. I am advised by my Friend Smith, of Michigan, not to attempt to draw it together. I could draw it up by tightening the screws, but he advised me not to do it and I will take his advice. I had it in mind that I could take the hose, I have a wind-mill and tank, and wet it on the inside a few days before I wanted to fill it, and have it filled up tight and nice.

Mr. Payne: Didn't it swell some while going through the process?

Mr. Billingsley: It did swell some.

Mr. Payne: Did it swell until it was pushed out?

Mr. Billingsley: No, sir. I never put up silage so dry as this year; it was simply a matter of necessity.

Mr. Payne: Did I understand how many tons that held?

Mr. Billingsley: We estimated it to hold 25 tons.

Mr. Payne: It cost $2.50 a ton to fill it?

Mr. Billingsley: That would be a ton capacity; it didn't begin to cost that at all. I paid seventy-five cents a ton for cutting it, and putting it in the silo, furnishing one team and two hands; that was the cost of putting in the silo, and I furnished the men inside that did the packing.

Mr. Collins: Have you had any great loss in silage?

Mr. Billingsley: I have had great difficulty in distributing the silage evenly. I have opened the silo, and it is in better condition than I have had before, and I attribute that fact to the better distribution of the silage.

Mr. Woods: We have hung a board up, so that it will strike against it and distribute it around.

Mr. Billingsley: I have found nothing so good as gunny-sacks; you can just walk around and put it where you want to.

Mr. Commons: How do you support the roof on the silo?

Mr. Billingsley: I made a round roof with rafters, which is a little expensive. It rests on the edge of the tub, right at the top, and then put on a cleat at the side, and on the inside, fastening it down so the wind cannot blow it off.

Mr. Commons: Any ventilation under the roof?

Mr. Billingsley: Yes; the width of the rafter is notched an inch and a half, or perhaps two would be better.

Mr. Hall: Is that silo out of doors?

Mr. Billingsley: Yes; it is near enough to my barn so I can make a kind of chute to climb up, and when the silage is thrown out it falls into the corner of the feeding stable, right at the end of the hallway.

Mr. Hall: Would you not rather have the silo in your barn?

Mr. Billingsley: Well, if I were to build a round silo I think I would put it outside; I might build a barn with that in view, and build it so as to put in round silos. The silos that are usually put in barns are usually put in between the bents, so as to have a square one in the frame work of the barn, but the stave silos I am familiar with are built outside, as a rule.

Mr. Hall: The silo for 25 tons would be about right for how many cows?

Mr. Billingsley: That question depends on how long you expect to feed them; you can make that estimate yourself. We estimate to feed about 30 pounds of silage a day; some cows will consume more and some less; that is, corn silage. Our corn and fodder is all cut together.

It is estimated that a square foot of silage, after you get down well into your silo, will weigh 40 pounds, and it may not weigh so much. It depends on the character of your silage. You can estimate how long it will feed your cows. I have fed heretofore twenty to twenty-five cows, and I commenced on my silage about the first of February, or from February until in June. A good deal depends on how much clover hay you feed. You can feed a great deal of silage, but I prefer to feed clover hay along with it.

Mr. J. S. Moore, of Plainfield: I want to ask one question. My silo is 16 feet square. After I dug down perhaps 6 feet, I found a place perhaps two feet wide and six feet long, spoiled, right in the center; what did it? It was good all around it. It was good on top of it and until it got 6 feet down; how did that occur?

Mr. Billingsley: I don't know; I have found that occasionally, though not so large as that; I have found occasionally something like a cube spoiled right in the center.

Mr. Moore: Was it mouldy?

Mr. Billingsley: I have not found in this silo a spot but what was all right.

Mr. Moore: Mine is lined with this clear pine and I oil that every year as I fill it, and it has not given a bit, nor has it shown any disposition to give one particle.

Mr. Billingsley: I have made some inquiry in regard to the cost of cypress. It would last almost indefinitely, I suppose easily 50 years. Cypress staves cost about double what yellow pine staves do.

Prof. Smith: I have had several years' experience with stave silos. In filling the silos we fill a sack about two-thirds full and hang it under the end of the carrier, and that makes a three-cornered conical shaped mass, and causes the silage to be distributed pretty effectively. Now as to covering, we have tried all sorts, and what kind of covering do you suppose we made last? No covering at all. We tread it down very hard on top, and then tread it down again, and then we wait until the next day and we pack it down again. This year we have opened two silos and they are spoiled down only about two inches and a half. That is the cheapest kind of covering we can get. I do not recommend this to you down here; your conditions are different. You may have some better covering. I would like to ask how many there are in the audience that have silos. I see nine only, Mr. Chairman.

Mr. Austin Roberts, of Westfield: We fill in a little and then let it settle. Sometimes the silage spoils worse than others; probably 6 or 8 feet down two or three inches in layers are spoiled, and we lay it to the fact that it has spoiled a little before any more is thrown on it in refilling it.

Prof. Plumb: I made a special canvass of the State some years ago on the question of silos, to find out where we had them in the State, and I found there were very few in Indiana. I would not be surprised if there were not 150 silos in Indiana. We have had a few people in this State, who, through some of the agricultural papers, have been persistently condemning silos, and one of the most persistent men to denounce the silo is a man I am personally acquainted with, and he, I know, built a silo very improperly, and, upon the most superficial trial, he has, from year to year, denounced the silo. I have used silos personally myself ever since 1884. We have one at Purdue. I am a believer in the silo on the basis of practical experience, and I tell you the sooner the farmers of Indiana that feed cattle, I don't care whether beef or dairy, add silos to their farm equipment, the more economically tney can produce their milk or beef. At Purdue we have one or more expert practical feeders, and I have never yet had a man on the place who took up the matter of feeding silage, who came from a beef cattle farm, and who had never had experience with it before, but before he got through with it was an emphatic believer in it, both for beef and for dairy cattle.

Mr. Nugen, of Lewisville: One question I would like to ask the parties using silage. Does it make more food in the corn, or does it enhance the quality of the food? If you cut up nice bright fodder and house it and take care of it, isn't that just as good as silage?

Prof. Smith: Yes, I think it is; but who in Indiana can so control the weather, after the corn is cut, so as to keep that fodder bright, and as valuable as where it is put in a silo where you are independent of the weather. I believe that if you cut up the fodder and keep it bright and clean, that it will do just as much good for your cattle as silage; but we can't do it, and therefore we put in the silo that which does not add anything to the food value, but by means of which we save more than we could under ordinary conditions without the silo, and then there is another thing, your field is cleared up in one operation.

President Stubbs: We will now close up the discussion of this interesting subject, and listen to a paper on

MILK.

BY S. B. WOODS, LOTTAVILLE.

Major Alvord, chief of the Dairy Division of the Department of Agriculture, holds that the dairy products of the United States are about one-fifth of the total farm products, which are placed at $2,500,000,000. This would give the dairies credit for the neat sum of $500,000,000 a year, more than all the money of all kinds in all the banks of the United States; more than all the silver and gold produced in the world in a year. The milk for one year from the American cow will buy all the iron and steel products, all the gold and silver, all the copper, lead and zinc, in fact more than all the metal products for a year. So that if we had free coinage in iron, steel, copper, lead and zinc, as well as gold and silver, this free coinage would not buy the cow's butter, and yet, my good friends, did you ever hear any of our stump speakers and politicians advocating protection and prosperity for our cows. Our Congressmen warm up terribly in the interest of Pennsylvania pig iron and coal, Michigan lumber and Ohio wool, but do they remember the good qualities of the good cows of Indiana, who, with the help of good farmers and farmers' wives and children, are bringing more prosperity to the State of Indiana and also the United States, than any other product. They don't go on strikes. There is no national agitation between capital and labor. We never lose confidence and shut up shop for six months out of the year. We keep the store bills paid, our national credit good, and our lands in a high state of fertility. So, you see, the question of milk is a big thing. I do not advocate that everybody should go into the milk business, for I tell you, just as sure as you are a foot high, if you are not acquainted with the milk business, and you go at it you will get experience. For us fellows that are at it have had the experience, and a mighty sight of hard work, indoors and out. If you have got a barrel of money with which you desire to run a dairy for fun, that is all right. But if you run a dairy for a living and to make money you will think you have earned every cent of it, and some of them I am sure earn more than they get.

The average amount of butter per cow in Indiana and in the United States is 125 pounds per year, which is not one-half what a good, properly cared for cow will produce. There are a great many cows in Indiana and in the United States that produce three hundred pounds of butter, or over, a year, so what must some of them do that bring the average down to 125 pounds per year. What makes the difference between the cow that gives two thousand pounds of milk and the one that gives six thousand pounds? There may be no difference in the cows, but a wonderful difference in the men that care for the cows. Then again there may be no difference in the men that care for the cows, but a wonderful difference in the cows. There is just as much difference in cows as there is in men, and there is just as much in men as there is in anybody else. A happy combination is a good cow with a good man, and the surest way for this good man to get a good cow, is to get the best cow he can every time, and the best animal to head the herd that money will buy, and raise his heifer calves.

It matters not so much what breed he decides on so it has the dairy type, and has the dairy conformation. You never saw a man trot a race on a race track with his horse hitched to a heavy wagon; nor did you ever see a man haul a cord of wood on a light buggy; nor did you ever see a man expect to get a troting horse by breeding to a ponderous Clyde. This breeding business, like everything else, takes good judgment, knowledge and common sense. When you have a dairy heifer calf, there is a right and a wrong way to raise her. If you were raising beef animals as well as your dairy heifers you would not want them to run and feed together, for your beef animal would want to be fed for growth and fat. Your heifers, for milk, would want a highly nitrogenous or milk-making food, to promote growth and development, but not fat. If the heifer at any time lays on fat to any great degree she is likely to develop a tendency to lay on fat, where it should be the object for a milk cow to throw all her surplus energy, after supporting herself, to the making of milk. My best cows will come fresh as fast as I dare have them, and we will give them all the best feed we can get them to eat, and they will gradually milk off in flesh, until I would be almost ashamed for any one to see them. Their whole nature is to convert the food they eat into milk. If these heifers you have raised have been properly cared for, they have made a great growth, and at about sixteen to twenty months old they should be bred so as to come fresh at two or two and one-half years old.

Be sure and have this heifer fed the right kind and plenty of food, so as to have her strong and large, and develop a large udder, for that is one of the sure signs of a good milk cow. Feed her strong. There is no danger of a heifer having the milk fever. Do not breed her again under six months. Give her a chance to put some growth on her body, and develop her milking qualities before she is again taxed with the carrying of the young. Do not dry her off before four to six weeks of her coming fresh again, so as to form the long milking habit. The heifer is the mother of the cow, and just as much can be done toward developing a well-bred heifer into a good milk cow as there is in developing a trotting colt in making a fast trotter. Let me say right here, it takes just as much man, science, sense, brains and ambition to train a heifer as it does a trotting colt, and I consider it a great deal more useful purpose, although our fair and agricultural societies seem to place a great deal more of importance on the trotting colt than they do on the heifer.

I have said the cow should be fed the proper kind of food. When a woman goes to make bread she puts in a certain amount of water, salt, yeast and flour, and when properly handled and baked she makes good bread, for that is what bread is made out of. The mason, to make mortar, uses lime, sand, water and hair, for that is what plaster is made out of. One hundred pounds of milk should contain about 87 pounds of water, 4 pounds of fat, 5 pounds of milk sugar, 3.3 pounds of casein and albumen, and 0.7 pound of mineral matter or salts. A cow cannot make milk and put that material in it without she has got it to do it with, any more than a woman can make good bread without the necessary articles to make it of, nor any more than a man can make good mortar without lime, sand, water and hair. I have heard men that keep cows say: "No, I won't buy any bran; corn is cheap; I will feed them more corn." It would be just as sensible for the woman making the bread to say, "Water is cheaper than flour; I will use more water and less flour;" or the mason to say, "Sand is cheaper than lime; we will use all sand for our mortar."

We must have for our cows what is called a balanced ration. That is, a ration that will supply the right kind of material to make the milk of. You have got to have a certain amount of protein and carbohydrates and fat. I think about forty pounds of silage, ten pounds of corn stover, eight pounds of bran, three pounds of gluten meal, and one pound of oil meal for good-sized cows, supply about a balanced ration. A cow's appetite is about like that of any other living creature. She likes a change. So I would have some ground oats, malt sprouts, small potatoes, beets, turnips and clover hay. The more variety the better. But you want to keep it pretty well balanced. If you have no silo, put your corn in big shocks before it gets too ripe. When it gets thoroughly cured, haul and put it in the barn, shed, or stack, or, as some do, leave in the field and haul as used. Also, have some sweet corn and sorghum oat-hay (that is, oats cut in the dough and put in the barn), and, if possible, have clover hay. Sell all your timothy. You can always get more for it than it is worth to feed either to cows or any other stock. Feed your cows all the corn stalks with the corn on, oat-hay and sorghum; they will eat it up clean and no waste, except the butts of the stalks, and with about the same grain ration as with the silage, only feed more oil meal, so as to keep the bowels loose about as they are in the summer on grass. We have raised sorghum for the last two years, and, to put it mildly, we are pleased with the crop.

In feeding cows this way, the next thing in order is to have a good yard off from the barn with some good pigs or shoats in it, to work over the manure taken from the barn, to get everything out the cows did not digest. There is no waste. It will not pay to buy machinery to husk, shell, grind and cut up the corn and corn stalks, nor will it pay to haul your corn and oats off and pay for having them ground after husking and threshing, but it will pay a dairyman, or any other man, who is cutting up a good deal of field corn, sweet corn, Kaffir corn or sorghum, to have a Deering corn harvester to cut up these crops, and bind them in nice bundles ready to throw on the wagon to take to the silage cutter, or to put in big shocks, all ready for easy handling thereafter. I have cut up and handled loose corn until I would get so tired I have wished that I had never seen cows. But with the harvester it is different. A common team will take it all day as fast as it can walk, one row at a time, and with the cutting of 50 or 60 acres of corn and sorghum, not one break, and no more trouble than running an oat harvester. It is to the corn crop what the mower was to the grass crop.

Grow big crops. Get them up in good shape, and get them into the cow just as cheaply, and with as little work as possible. You will have work enough without making any extra work. Build a fine, big red barn, if you have money enough, but if you have not, go out into the woods, cut down some good, straight poles, set them in the ground, buy some rough boards and building paper, and make a good, warm stable that will never freeze with the cows in it in the coldest weather. It does not make so much difference what a stable is built of, so it is warm, lets in plenty of sunlight and ventilation, and is convenient to feed, and arranged to keep the cows clean and healthy. Make the winter conditions just as near like June as possible. As to water, have plenty of the pure, clean, warm article. You know milk is 87 per cent. water, and in the city of Chicago I think it is sometimes more. If the water gets cold, make it warm with a tank heater. As to summer, we mostly have depended on pasture, but if you depend altogether on pasture you will get left. The drouth will come, pasture and cows dry up, and the profits are not forthcoming. The way to get over this is to sow rye in the fall, clover, oats and Canada field peas in the early spring, and sweet corn and common corn later on, and don't be afraid to give it to them. If you do, the cows will lose confidence and the milk will go into hiding. Yes, there has got to be confidence in the cow business. You want to have faith and believe that every cow you have on the place will pay for good feed and treatment by a return in milk. If she betrays you and puts the feed on her back instead of in the pail, you can get even with her by putting her in quarters and selling her to the good people of your neighborhood. With a good man and woman, good cows, good barns and lands, good water and care, you should expect a good, clean lot of milk and a fair profit. But with the reverse the result will be the reverse. Milk is a perfect food. If our children would eat more bread and milk it would be better for them. If the women and girls would drink more milk they would be better looking, and if some of our men would drink more milk and less whisky, it would be better for them and their families, and the whole community, and help the price of milk.

Mr. Shafer, of Hagerstown: In regard to rations for heifer calves, I would like to ask Mr. Woods what he calls the best ration for heifer calves?

Mr. Woods: We feed them about the same quality of feed we do the cows—bran and gluten meal and silage—only, of course, we feed it to heifers in smaller proportions than we do to cows. We feed them silage, and they like it and do well on it.

William Edgerton: Do you feed the sorghum cut up, or do you use it entirely in the form of silage?

Mr. Woods: We use it entirely, green. We do not put it in the silo at all. We use it after the corn is dried up; it, of course, keeps green longer. You cannot put it in the barn because there is so much sap in the stalk. I have had wonderful results from the sorghum. It is all right until after a severe freezing, and then it gets black inside, and the cows do not like it so well, but they will eat it—horses, cattle and calves.

Mr. Edgerton: It sours?

Mr. Woods: Yes, and it don't taste so good, but up to the time of hard freezing, everything is anxious to get it.

Mr. Edgerton: It serves as a substitute after pastures are failing?

Mr. Woods: Yes, and you can get along without opening your silo so early in the season.

Mr. Billingsley, of Indianapolis: I use sorghum, but quite differently. I use it a great deal for the number of cows that I have. You first want to put your ground in good condition, and you want a rich soil, and then after it is in good condition, take a two-horse wheat drill and drill about two quarts to the acre. Sorghum is rather slow at starting; it seems to make roots first, and afterwards you get the stalk. If I notice any large weeds coming up, I go through and pull them out. As soon as the sorghum gets fairly started, it will keep out everything, unless the weeds have the advantage to begin with. When the sorghum gets a certain height I just take a common mowing scythe and mow it off and scatter it in the feeding lot, where there is nice clean grass, and then let the cows get at it. I begin about the 15th of July feeding sorghum, feed through that and wait a couple of weeks, and then I have an early crop of corn that comes in, and I feed that; and then I have another crop of sorghum, and commence cutting it off the second time. Year before last I got two and one-half crops off, cutting it in that way. I made an estimate of how much, by weight, I would get off of about two crops, but I wouldn't like to tell you here, because you might lose confidence in my veracity.

Mr. Elwood: I would like to emphasize what Mr. Woods has said about feeding it. We have used it two years. I think the man who fails to plant a patch of sorghum hasn't much foresight. It is the same way with sweet corn. We made about three plantings of the sweet corn and three of the sorghum. I fed nearly all the sweet corn before I commenced on the sorghum, and had that to run along until it froze. I do not like to feed it after it freezes.

Mr. Blank: I don't think this Association ought to go on record as believing everything that Mr. Woods has said in regard to grinding feed. He says it doesn't pay. It seems to me that grinding feed does pay, especially for milk cows. I would like to hear from some one who has had experience as to whether it is best to grind oats and corn for cows.

Mr. Woods: I have been grinding oats and corn for three years, and find it pays me. I grind oats and corn together.

Mr. Shafer: What is oats and corn worth a bushel?

Mr. Woods: Oats 13 to 15 cents, and corn 15 to 20 cents.

Mr. Shafer: What does it cost you to haul it?

Mr. Woods: Nothing but the work.

Mr. Nixon, of Henry County: I want to ask if there is anybody here that has had any experience in raising Jerusalem corn? I suppose there is somebody here from Carroll County, where, I understand, large quantities of it have been raised this year.

Mr. Mills: There were two patches in our locality last year; the stalk was hard, and cut up stiff, and didn't give good satisfaction; there was none planted this year to my knowledge.

Mr. Parker: What do you think about sorghum impoverishing the ground? What experience have you had?

Mr. Billingsley: So far as I am concerned, I have not noticed any difference. I manure my land well; it is rich land and I have not noticed any particular drain on the fertility of the soil. I would like to bring out one point, and that is the contrast between feeding good fodder corn and feeding silage. If you take fodder corn with the ear and cut it up and feed it, it is everybody's experience that the animals will pass a great deal of the corn whole, which is not true of silage, and so we claim that silage is a better distributor of the food.

Mr. Parker: Have you got the quantity of sugar in that sorghum that you would have if matured?

Mr. Billingsley: I do not claim that it would have the same saccharine qualities that it would have if matured. But the cows relish it well, and they milk well, and it is a good quality of milk, and that is about all I care for, and it comes when you are likely to have dry weather, and I don't know of any cheaper feed. This past year, though, I didn't have any sorghum, and I know some of the difficulties I have had to undergo. Last spring I bought my sorghum seed and planted it, and I don't think I got one hundred sprouts from the two and one-half bushels I sowed. It had been heated, evidently.

Mr. Holloway, of North Manchester: Has anybody had any experience in curing sorghum for winter feed as they do in the West? They cure sorghum for winter feed in the West without trouble. I was so unfortunate as to spend one year, at least, in southwestern Kansas, and I fed my horses almost entirely on cured sorghum. There was no trouble there, and I would like to know whether anybody has tried it in this country. They shock it like corn, and cut it early enough to get it thoroughly cured. My horses liked it, and I even fed hogs on it. Through there they had no corn to feed, because they could not raise it.

W. S. Commons, of Centerville: I never had any experience that way, but a neighbor of mine had. The trouble was it turned black and soured when it froze; it didn't cure it.

Prof. Smith: I don't like to contradict these men, as our conditions are so different from yours, but with us, where corn can be grown, it is better to let sorghum alone, because the material for food that we desire to have is so much richer in corn than it is in sorghum, and Kaffir corn is 1.7 per cent. richer in protein than sorghum in this respect, and so far as the water contents are concerned the per cent. of water is greater in the sorghum. This is the average for several years' testing at the Michigan Station.

Mr. Billingsley: Is that the experience of all tests? From what I can learn, the tables show the same percentage of protein in sorghum and corn.

Prof. Smith: I think you are misinformed.

Mr. Billingsley: I can grow twice as much feed out of an acre of sorghum as I can out of an acre of corn.

Mr. White: I have had considerable experience with sorghum, but not so much with reference to growing it for the purpose of feeding it to cows. I have a sorghum factory. One year a considerable portion of my sorghum got frosted, and I thought I could never make molasses out of it, and so I thought I would cut it up and shock it and let it stand out until it was thoroughly cured in the shocks, and haul it into the barn. I never experienced any trouble whatever with it, and we thought that we never had better feed for sheep, cattle and horses.

On motion of Prof. Plumb it is decided by the convention that the President appoint a committee on resolutions, which the President announces he will appoint later.

President Stubbs: Owing to important business matters, Mr. B. G. Cox, of Terre Haute, who was to have been here and read a paper on "Experience in Preparing Sanitary Milk," will not be with us. He, however, has sent his paper, which will be read by the Secretary.

EXPERIENCE IN PREPARING SANITARY MILK.

BY B. G. COX, TERRE HAUTE.

The subject allotted to me is "My Experience in the Production of Sanitary Milk," or milk of a standard quality, free from contamination with disease-producing germs.

Milk is one of the most sensitive articles entering into human consumption. Not only does the individuality of the cow modify it, but a great many extraneous influences change it for better or for worse. I shall try and deal with such factors as are under our control in the production of milk.

My experience has demonstrated that there are four essential points to be considered in the production of sanitary milk:

1. The cow.
2. Sanitary hygienic measures.
3. Means to retain the milk in its original purity as received from the cow.
4. The bottling or preparation for distribution.

1. The Cow.—The cow is the foundation stone in the consideration of this matter. She should be healthy. Milk from cows suffering even from temporary indisposition should not be marketed. Great stress should

be laid on the necessity of an absolutely sound individual, as a healthy animal is an essential factor in the production of sanitary milk. My experience with animals of all grades and breeding has proven to me that the Jersey is the best type of dairy cow. While the Jersey does not excel in quantity of milk, she excels in quality, her milk being the richest and purest. Another point in favor of the Jersey is that she is naturally the cleanest and best animal. She instinctively avoids all food which is unclean or unfit for a proper nourishment of her body. The public recognizes quality and merit. It pays. But even the milk from the Jersey is not wholesome, unless the animal is healthy, and placed under proper sanitary and hygienic conditions and surroundings. This brings us to the next point.

2. Sanitary and Hygienic Measures.—Cleanliness is essential to success in conducting a sanitary dairy. The barn, therefore, should be built and arranged with a view to perfect cleanliness and ventilation. Every precaution should be taken in the way of sanitary improvement, to see that the barn is perfectly free from foul odors, or germ-laden filth or dust. Another important point in this connection is in the process of milking. The party who does the milking should be healthy and cleanly, as to person and clothing, so that the milk may not be subjected to any disease germs, with which an unhealthy person might infect it, or to impurities from unclean hands. The possibilities of infection are so numerous, too much care cannot be used. It is also essential that the udder and teats be washed, and flank and thigh and under belly be dampened, in order to prevent any hairs or dust dropping into the milk.

Now, as to the food. Great care should be taken in its selection, to secure that which is most nutritious and calculated to increase the quality of milk rather than quantity. While certain kinds of food increase the quantity, they do so at the expense of quality, but quality and not quantity is the objective point in sanitary milk. My experience has proven to me that ground cereals and clover hay make the best food. In regard to silage or malted brewers' slop, my experience with this was not satisfactory. I experimented in this way: I took milk from silage-fed cows and milk from cereal-fed cows (for the sake of brevity we will refer to this as cereal and silage milk), placed the bottles in different cases, and instructed my driver who has charge of the distribution of the milk to deliver it in rotation, charging him to leave without any comments the silage milk with regular patrons only, who were accustomed to cereal milk. I then awaited a report. After two or three days a number of my customers with whom we left the silage milk withdrew their patronage, giving as their reason that the milk did not taste as it formerly did, and in cases where it was used as infant food they complained that the milk did not agree with the infant. Complaints followed from every one with whom the silage milk was left. After repeated experiments of this kind we had proof sufficient that the cereal milk was superior in every way, for the reason that those who are accustomed to cereal milk are more capable of judging, having been used to pure sanitary milk, than those who do not know what pure sanitary milk is. We must have a standard for comparison before we are competent to judge. We all concede the point that milk as it comes from a healthy cow is pure and sterile. It is the impurities with which it comes in contact after being exposed which contaminate it. My object is to retain the milk in its original pure condition as drawn from the cow. This brings us to the third point:

3. Aerating and Cooling, or Means to Retain the Milk in Its Original Pure Condition.—As soon as the milk is drawn from the cow it should be taken to a building constructed and fitted for the proper treatment of the milk. All of the utensils used in this building in the preparation of milk for bottling are thoroughly washed and cleansed, then put through a steam process. The minutest details as to cleanliness are not neglected.

The first step in the manipulation of the milk is the removal of the animal heat and natural odors. This can only be done while the milk is warm, as it comes from the cow, by quick aeration and cooling, which is done promptly by atomizing with a blast of cold filtered germ-free air, at a temperature not to exceed 40 degrees. Coming into direct contact, the milk quickly gives off its volatile gases. Aeration by an atomizing process is the only way in which this can be done. By bringing every drop of milk into intimate contact with pure cold air, it gives up these animal odors. Our system has been perfected after numerous experiments. It is impossible to effectually remove the odors from the milk after it becomes cold. It must be done while the milk is in its natural temperature as drawn from the cow. Reheating milk and subsequent aeration does not remove the odor. It must be still further chilled in a cooler that precludes any possibility of exposure to outside influences which would contaminate it. From here it is bottled direct through a tube reaching to the bottom of the bottle. My experience with the different so-called aerators and coolers has proven that they are very defective, their object being the destruction of contaminating influences rather than the prevention. Instead of preventing, they only invite contamination, as all of them expose the milk more or less to the surrounding air, which should be avoided.

Pasteurizing and sterilizing are for the destruction of microbes and to make milk keep. Now, I claim that if proper measures are taken to prevent contamination, there is no necessity for pasteurizing and sterilizing. While I admit that these processes increase the keeping quality of the milk, they do this at the expense of its digestive qualities. The objection to these or any other methods which necessitate the heating of the milk to near the boiling point, is that it is thereby rendered less easy of digestion, and is not desirable for invalid or infant food. The technical difficulties in carrying out some of the processes for sterilizing milk by heat are so complicated that it requires an accomplished expert to carry them out properly. The method I employ does not aim at the destruction of germs, but to prevent their development, not by heat, but by cold.

We now come to the fourth and last point.

4. The Bottling.—The dispensing of milk in glass bottles has been objected to on account of the disease germs which may adhere to the bottle in houses where there is a contagious disease. This danger has been eliminated in our case by a sterilizing treatment which all of the bottles receive. The bottles are first washed in the Yawman & Erbe bottling machine, and then rinsed in two rinsings of clear water. They are then placed in a large square boiler, thoroughly locked and sealed, into which steam is injected by a slow process, starting with one or two pounds' pressure, which simply moistens the bottles with hot steam, almost water, before raising the temperature. The steam pressure is then increased to ten or fifteen pounds and the temperature raised to over 300 degrees Fahrenheit. This has been acknowledged by bacteriologists as the only effective means of destroying all impurities that may adhere to the bottle, extreme dry heat, or dry cold, not being so effective as first moistening the bottle, then bringing it up to a temperature of 300 degrees. The bottles are held in this heat from thirty to forty minutes, when they are cooled, but are not taken from the sterilizer until ready for use. Thus you can see that the bottles are not exposed to the surrounding air before being put in use.

Before concluding, allow me to recapitulate: A healthy cow, kept in a clean stable, supplied with pure food and water, milked from a clean udder, by clean hands, into a clean vessel; proper aeration and cooling and bottled in sterilized bottles. All of these conditions, if complied with, will produce milk free from contamination.

In conclusion, I can only say that the many testimonials which come to me unsolicited by those who have tried the product of my dairy, especially in cases where the milk is used as infant or invalid food, are a great source of gratification to me, and I feel that I am amply paid for the time and trouble spent in study and experiment. I only hope that many more will take up the subject of milk, which has been so negelcted in years gone by, and that the interest taken will have a corresponding effect in preventing many of the diseases which, no doubt, owe their origin to the use of impure milk.

Prof. Plumb: We have with us Mr. Van Norman, who is, I think, quite familiar with Mr. Cox's plan, and I think, if he has no objection, that he might state to this audience something of the methods employed there, further than Mr. Cox has touched upon it.

Mr. Van Norman: I think from what I have seen from the handling of milk for delivery in the city, where they want an extra quality, and for which an extra price is paid, that Mr. Cox has a system which is the most simple I have ever seen. There is just one thing I would like to take exceptions to, yet it is merely a personal one—that is, the ill effect of the silage. He told me all about it, and I don't think he gave it a fair the trial, in so far as the silage milk was bought from a herd where he did not know anything about the quality of the silage. I believe that there is the loophole which will explain his results. There is no question but what he had the trouble with the milk. It was not from his herd, and it was not aerated for at least half an hour, and more than likely an hour and a half. This method of aeration was very inefficient. He was lately put in a cooler which cools the milk without exposing it to the air. It is very hard to keep it clean, and requires exceptional care. In a small town his process would not be profitable because of the extra price he charges for his milk.

Mr. Commons: What does he get for his milk?

Mr. Van Norman: Eight cents.

President Stubbs: I announce as the Committee on Resolutions, T. A. Shafer, of Hagerstown; Silas Holloway, of North Manchester; Austin Roberts, of Westfield, and William C. Hall, of Lewisville.

The convention then adjourned at 12 o'clock, noon, Wednesday, December 29, 1897, until the afternoon of the same day, at 1:30 o'clock, at which time the convention reconvened.

WEDNESDAY AFTERNOON SESSION.

The Association was called to order at 1:30 p. m., by President Stubbs, and an essay read on

HOME BUTTER MAKING.

BY MISS SARAH EDGERTON, SPICELAND.

F. W. Mosely, in Western Rural, as reproduced in the Jersey Bulletin, of July 8, 1896, gives quotations from H. E. Alvord's "Statistics of the Dairy," in which the number of pounds of butter per capita produced in the United States from 1850 on, is given—that is, for each census year. These statistics show that the production in 1850 was 13.51 pounds; in 1860, 14.62; in 1870, 13.33. The first report of creamery butter was given in 1880—0.58 pounds per capita. The total product of both home and creamery was 16.08. According to the last census, the whole production had increased markedly, the total being 19.20, the output of the home dairy being 16.33, while the creameries furnished only 2.91. Though the rate of increase in creamery butter was greater than in home-made, still its total reached less than 16 per cent. of the whole.

In view of these facts, are not the dairy farmers worthy of attention and education, both for their own and the State's good? Our farm butter is often contemptuously called grease—"axle grease,"—and the bad of it is that too much of this accusation is true. Is there a necessity for this?

Not at all. It is a fact that the best butter is made in private dairies, and it is demanded for the tables of those who can and will have the best. The private dairyman has the cows, their care, feeding, cleanliness and comfort are all under his control, while the creamery has to do the best it can with what is brought to it.

There are many causes for the low grade of farm butter. Some persons scarcely do anything carefully or accurately. Their minds are not on their work, and if they have extra success or serious failure, they can not detect the causes, and profit by the experience. Others are in too hot haste to do something else to give the care that must be given if it is well done. Many others have not the conveniences to do a good job, and jog on in the old ruts, when they might do better if something would happen to shake them up a little. The farmer who makes butter for market needs no different care of his cows than he who sells milk or cream. All should do their best. I shall therefore assume that the milk is first-class.

Large factors in the home dairy problem in hot weather are: getting the milk cool and keeping it so; and in cool weather, escaping the strong cheesy and bitter flavors. For the best success in butter-making it is necessary to have cows coming fresh at intervals throughout the season. I want to emphasize this. That is a first preventive of bitterness. The next is to never have anything else where the milk and butter are. The bitter molds thrive in a much lower temperature than the ferments, and cold must not be depended on too much as a preventive. More than forty years ago my mother abandoned altogether souring her cream in winter, because it so often contracted some ill taste or smell. I have followed in her footsteps and think she trained me in the right way. I never sour cream. I am pleased when the weather allows me to have it sweet. Exposure to the air is said to ripen cream without its becoming sour. My dairy windows are always open when the weather will permit. I made some experiments years ago that added to my convictions that souring was not certainly necessary. I had a jar of cream, stirred it till the quality was uniform, then divided it into two equal parts. One part I took to the kitchen and kept it warm till just as near right as I knew, while the other staid in the dairy. I treated them as nearly alike as I could in churning. The sweet-cream butter came in twenty minutes, the sour in thirty; each batch made a little over five pounds; the sweet made one and one-half ounces the most. The reason, doubtless, that the sour was the longer coming was that it was so thick that it was not well agitated. I made another test, in which I could find no difference in amount of butter.

It may be that there are milks that require the cream to be sour to make it churnable. I have sometimes had cream to not yield its butter, but the sour did no better than the sweet. Fresh cows in winter will assist in the churnability. It is charged that sweet cream makes insipid butter. I do not depend upon the cottage cheese taste for aroma. I have been sending butter to one lady in Indianapolis for fourteen conescutive years, and to others twelve or thirteen. They have not discovered the lack of flavor; at least they say enough pretty things about it to satisfy me.

If cream is to be soured, the quicker it is done, the less danger of a bitter decay. In these days it is not "cheeky" to tell what one is doing and has done; we all want to know just that thing, so I will keep on.

I have a cellar dairy that my father built more than forty years ago. It is about ideal eight months in the year (for a small dairy); the other four it is too warm. It is in the northeast corner room; a door opens to it from the other cellar, right at the foot of the steps which come down from the kitchen. It stands out of the ground about two and one-half feet; has a window on the north and east sides, hung at top, to button up. The floor is of grout, the walls, brick and plastered, and the ceiling plastered. I keep a table in the middle of the room for milk, a case of shelves for butter, and a side table for cream; these can all be taken out, cleaned and sunned. Nothing goes into my dairy but milk and its products, and I am careful that the door from the cellar shall be kept closed. Our soil being clay, the dairy is damp; so it is a good seed-bed for mold. The proper use of whitewash keeps the walls perfectly sweet. Sulphuric acid kills mold immediately. If the milk table or butter shelves begin to have a smell of it, a washing with a solution of the acid effectually destroys it. Care must be used in handling the acid, for it produces an intense heat, when water is added, and even a five per cent. solution will destroy cotton fabrics, and discharge colors in woolens. Some years ago I had help that was not careful, milk was spattered on the floor and dried; ordinary washing did not cure the trouble. It got to smelling like a creamer or milk box that had been tightly closed. I had the floor washed with boiling water, made strong with Lewis lye, and that ended that trouble.

Many years ago I saw a very nice arrangement for keeping milk and butter, simply a dry well four or five feet in diameter. A table or platform that comfortably fitted it was raised and lowered by a windlass above. Indeed, it looked like an old-fashioned well with its curb, ready for its "moss-covered bucket." It had a nice fitting cover which shut it up when the milk was down, and served as a floor or support for the milk-table when it was drawn up.

In all our country about here the temperature of the earth, and our wells of water from fourteen to eighteen feet below the surface of the ground, is from fifty to fifty-six degrees, a temperature always low enough for churning. One could not go up and down steps eighteen feet, but dummies to raise and lower things to cellars are common, and if to a dairy something like mine, there could be added a lower step to be used during the hot season, half the trouble in making butter at that time would be avoided, and a considerable percentage more of butter be made. Quite a herd of cows could be accommodated if a separator should be used. I have made an arrangement by which I keep my cream in the well, and get the advantage of that idea. It would cost something besides the labor to make a dry well; it would have to be cemented with the best cement, but if it is well done it might last a hundred years, and butter will probably be made as long as there are folks. It might be better, on account of the closeness of a dry well, to have only the walls plastered, and allow water to come and go at will. In either case extreme care would have to be taken, that no milk should ever be spilled or spattered.

Cleanliness and the right temperature of cream at the time of churning are pivotal points in all gilt-edged butter. Cleanliness means more than that the milk shall be clean from the stable, strained through clean strainers into clean vessels. It means it must be skimmed while fresh and the cream churned while fresh. There can be no filth in milk to spoil the taste and keeping qualities of the butter, more foul than it (with the help of the evil germs that find their way into it) makes from its own self. In hot weather I skim at 24 hours; in cold, at 36. I don't say. "I have this or that something that needs to be done, so I will leave the skimming until morning." The milk is to be skimmed as punctually as the sun comes up and goes down. Stir cream every time there is fresh put in. Churning should be done three times a week, unless milk and cream are kept very cold. Our dairy thermometers have the churning temperature marked at 62°, and that is a good average, but good butter is churned from 54° to 68° Fahr. It is easy to determine the right temperature in one or two churnings. There are no abrupt variations, unless there is considerable change in cows, more fresh ones, or a change from dry feed to grass. A thermometer is an absolute necessity, and costs only twenty-five cents.

I scald the churn in the evening, in hot weather, and at bird-peep in the morning I fill it with water from the bottom of the well, wet the butter-worker and put wet cloths on it; put the bowl in a pan of cold water, and churn immediately after breakfast. I don't want my butter to become so warm as to need cold water put into the churn. I want it to come cold and solid; then work dry and salt one ounce to the pound. If it is not worked dry before salting, the saltness is uncertain, and if a quantity of sour buttermilk is left in the butter, it will deteriorate in proportion to acidity, and the length of time it is left in. If the weather is very hot I put the butter into the cream bucket, and that in the well to set; if not, it goes to the dairy, to be reworked within a few hours.

It has been said by some one who claims to know, that you can't work milk out of butter, only work it in. Can you work water into putty? Neither can you work milk into butter, if it is churned at the right temperature, and is being worked at the right temperature. Also we are told that we must be very careful or we will overwork butter, spoil the grain and make it salvy. I sent three parcels of butter to the Columbian Exposition at Chicago. I worked the butter a good deal. I made it as I usually do, and expected it would be said to be overworked, but it was scored "Perfect" in grain every time. I have about concluded that if churned at the right temperature and worked at the same, no reasonable amount of working is going to injure the grain.

I wish I could stir up every farmer and his wife in the State who makes butter to do their very best. They would feel proud. Every one feels the better and of more importance in the world if he succeeds. Each one I know has his surroundings and limitations. The thing is to do the best under the circumstances, and as fast as possible make circumstances. It is remarkable how much strong arms directed by common sense and a will, can do. Wherever there is a spring or a well of cold water, and good cows, there are possibilities for the best of butter. If, for the present, one can not have milk sit where it is as cold as desired, the cream that rises is the best; the cream can be got cold and butter of the best quality be the result. A churn filled to overflowing with water at 50° to 56° for two hours in early morning will remain cold during churning. If cream is put into a tin bucket, and that put into a tub full of cold water well covered, and the whole enveloped in some old carpet or quilt to keep outside the air-way, it will usually be cold enough as soon as the churn is; if not, put cream in fresh cold water and stir; that will hasten the cooling.

Creamers, for those who like them, and especially if ice is plentiful, are desirable. A double-walled box with tight-fitting cover, for setting shallow pans, is also desirable. Hunter Nicholson says, "shallow setting is as good as any gravity device," and I think a little better than any other. The less the depth of milk through which the cream must rise, the more perfect the creaming. There is the same objection to both these methods; the vessels must be tightly closed in hot weather, and there is always a disagreeable smell when first opened. Perhaps no device for creaming entirely avoids that, except separating. I have had no experience with the separator; I might find many defects. With enough cows it seems ideally perfect.

DISCUSSION.

Mr. Beckman, of Brunswick, Lake County: I do not understand how Miss Edgerton can churn sweet cream and get as much butter as with ripened cream, unless she has it very heavy.

Miss Edgerton: Our cows are Jerseys, and I expect likely the cream is a little thicker. I don't know of any reason, only I just know that it is so. You will remember I speak in one place in my paper to the effect that the milk of some cows might have to be soured. In my experience I have had no difficulty; it is generally just as well sweet as sour.

Mr. Beckman: Are you careful not to get any skimmed milk in with the cream when you skim it?

Miss Edgerton: No, not exceedingly so at all; I want to be sure to get the cream, and if I get a little milk I don't mind. But I will tell you how the butter comes mostly. In the summer I am not so situated but what my cream is soured, and generally it is so thick when it first begins to come that I have to give from one-third to one-half as much water as there is of cream to make it so it will stir. I use a Davis swing churn. It gets so thick it will not stir at all. That will probably give you some idea.

Mr. Benjamin: I would like to ask if Miss Edgerton has any rule to govern the temperature?

Miss Edgerton: No, and yes. I always try to note what is best for the season. At the present time I am churning at 58°. There is a difference in cows about that, as well as in times of the year. Usually in the winter we churn at a higher temperature than in the summer, but so far this winter 58° seems to be the thing. I churned very good butter last summer at 62°. I had a fresh cow that for some reason required a higher temperature. That is, she added considerably to the cream, but unless I have a fresh cow I hardly ever make such a test until I see it is a little too cool, or a little too warm, or something in the churn, and then I try to find out exactly what is best. It does not give me any trouble to find out what is best; it usually runs along for months nearly without any change.

Mr. Edgerton: The average rate is about 62°.

Prof. Plumb: How long does it take your butter to come ordinarily, when you churn at 58°?

Miss Edgerton: Thirty minutes.

John Payne, of Newcastle, Henry County: I want to ask if it is not your experience with Jersey cows that some make more solid butter than others, and the solider the butter the longer it requires to churn it?

Miss Edgerton: Yes; I don't think it takes any longer to churn it; my churning, I consider, is pretty good. I never heard of that plea against Jerseys that it took longer to churn; I had supposed it took a little less time.

Mr. Woods: What is the feed you give your cows?

Miss Edgerton: I always have plenty of clover hay and corn fodder for rough feed, and I give them corn, oats and bran, and a right good mixture of all. I never have fed any cotton seed meal. I have fed oil meal frequently, but not always.

Mr. Andrews: If cold milk instead of water is added to the cream, will it not do as well as water?

Miss Edgerton: I think so; it is very convenient to have water. In summer the milk often sets in the dairy where it is up to 70°, so that it is much better to have cold water put in. I would just as lief put in milk as water.

Mr. Beane: Now, about this skimmed milk. We have been making butter for several years. Our well water is cold; it stands at 52°, and we have had trouble sometimes in the buttermilk circulating through the butter. To draw this off, we find that skimmed milk can be used to better advantage than water. The milk not being so cold, the buttermilk will separate and allow the butter to come to the top, so we can draw the milk off better than by using cold water.

Nathan Payne: There is a question I want to ask here, referring to overworking. There are so many people who churn with dashers in the churn. If they would take these out, and use a Davis swing churn and churn their butter, they would find out that they would not have overworked butter. It is all in the motion of the churn. There is nothing in it to pound up the butter like lard. When it comes, it comes in little small bits not much larger than pills, and sometimes in lumps as large as hen eggs, and I think if I were in the dairy business I would use no other churn, and take out the dashers.

Miss Edgerton: I don't like dashers in the churn. I like the box churn a little better than anything I have ever seen.

President Stubbs: We will now close the discussion of this interesting subject and listen to a paper on

DAIRY LITERATURE.

BY H. C. BECKMAN, BRUNSWICK.

We believe that the majority of dairy farmers are not to be benefited by the results of the years of careful study and research carried on by our principal investigators, for the reason that it is not brought sufficiently to their attention. True, the bulletins of the Experiment Station are sent broadcast over the land, and the publications on dairy subjects are advertised in the farm papers, but the average farmer is not a literary man. He is not accustomed to reading much, and naturally does not make much of an effort to find out just what has been published.

There is scarcely a time when the farmer is not struggling with some perplexing problem that comes up in connection with his daily work. The chances are ten to one that he could get a bulletin covering exactly the points that have been bothering him. There is scarcely a bulletin or book published that would not prove interesting reading to a dairyman, but there are so many that it is out of the question to ask him to read all of them.

I will dwell briefly on some of the late publications, and call attention to some of the more interesting paragraphs, with the view of getting my hearers sufficiently interested that some of you, at least, will send and get the books.

The advent of the cream separator has revolutionized butter-making, so that the rules laid down by the old standard writers do not apply to-day as they did then. For example, churning is now done at from two to five degrees lower temperature than was the case ten or fifteen years ago. At that time the cream in ordinary practice was what is now known as light or thin cream. Such cream does not churn as easily as heavy or rich cream. It has been found that a rich cream can be churned better and quicker, producing more butter of an improved quality.

One of the first publications of value since this new condition of affairs is "Monrad's A B C of Butter-Making." This came out in a series of articles published in the Dairy Messenger.

Mr. H. B. Gurler, one of the pioneer dairymen of the Elgin district, recognizing the need of a simple and up-to-date work which would be appreciated and understood by the average butter-maker, published a work in which he gave the result of his many years of experience. This work, which is entitled "American Dairying," is simple and clear enough to be understood by any butter-maker, and it touches upon all the different conditions met with. The first half is devoted to "Private Dairying," and commences with the dairy herd, selection, breed and breeding, feed, management, etc.

The average cow in the United States makes only 130 pounds of butter per year. There are herds that average 400 pounds. This will indicate that there must be an extreme difference in cows. A cow that does not make at least 200 pounds of butter per year, does not pay for her keep. So it will be seen at a glance that a large majority of cows are unprofitable.

One of the first things a farmer should do is to test his cows and weed out the unprofitable ones.

Mr. Gurler discusses the following subjects: The dairy herd; feed and management; care of dairy utensils; milking; milk from the cow to the cream vat; ripening and churning; salting and working; marketing butter and skim milk. I will quote a paragraph from a chapter on ripening and churning: "Different Temperatures for Churning. We now have the cream from the shallow setting and from the separator, ripened ready to churn. The next point is to secure the proper temperature before putting it in the churn. It is best to cool the cream from the shallow-setting system to 54 to 56 degrees before churning. This cream is rich in fat and can be churned at this temperature without any difficulty. Let the cream stand at low temperature before churning long enough for the fats to solidify or harden. The cream from the deep cold system has a much smaller per cent. of fat and will need to be churned at a higher temperature. If we undertake to churn this cream below 55 degrees we will probably have trouble from its swelling and will find the churn full of frothy cream. The proper temperature for this cream is 60 to 62 degrees in winter and 58 to 60 degrees in summer.

"The separator cream should be cooled to a temperature to correspond with the per cent. of fat it contains. If the separator is adjusted to take from one-seventh to one-eighth of the whole milk as cream, it will contain sufficient fat so we can churn it at a temperature below 55 degrees."

Another paragraph under the chapter on "skim milk": "Rules for Calf-Feeding—There are a few simple rules to follow in growing calves on skim milk, and there will seldom be any trouble. The milk must be sweet; it must be warm as the mother's milk, or 98 degrees, and care must be taken not to feed too much milk. Four quarts at a feed, twice a day, is sufficient for the average sized calf for the first month. Add a spoonful of oil-meal to each feed of milk. Let them eat what oats or shorts and hay they will. Oats are excellent feed for young calves. Never feed a young calf cold milk. Many times calves are injured by being fed too much milk, especially skim milk. Many persons think that because the cream is taken out they need feed more of it. This is a mistake. Overfeeding causes the calf to scour."

The second part of the book is devoted to creamery work, and touches upon much of the same as in the preceding, only according to conditions as found in the creamery. The first chapter is on the care of milk by patrons. I will quote a paragraph on milk absorbing odors: "In one instance I found milk that was not just right, and I could not tell positively just what the trouble was until I took some of it and warmed it to 110 degrees, when I could detect the odor of the hog pen. I sent word by the driver of the load for the man to come in, as I wanted to see him. When he came I learned from him that he put his night's milk in an open vat in a room a short distance from his hog-pen, and left the windows open to cool the room."

From the chapter on "Tempering and Separating" I give the following: "Sudden heating is not advisable, as milk so heated separates harder than milk that has been gradually heated. This is not theory. It is a hard fact that I discovered in comparing the work of different creameries. In one of our creameries we heated the milk for the separator with a jet pump which does its work very suddenly. In another the milk was heated mostly in the receiving vat. By the use of the Babcock test I found the most thorough skimming was being done at the creamery, where the milk was heated in the large vat to near the proper temperature, and finished up in the channel vat."

Mr. Gurler describes the improved utensils, separators, churns, butter-workers, etc., and has one chapter on the care of buildings and utensils. He also gives suggestions to those about to build a creamery.

In the appendix he gives an acid test of cream. That is a test for determining scientifically just when cream is at the proper degree of ripeness for churning. This test can easily be made in a creamery or on a farm.

Prof. F. W. Woll has translated a very comprehensive work by Gosta Grotenfelt. This is "The Principles of Modern Dairy Practice from a Bacteriological Point of View." This work is very complete, and is splendid for a dairyman who wishes to investigate. It touches upon all the whys and wherefores of the different steps in butter-making and cheese-making from a scientific standpoint. I consider this one of the best publications on the subject, and while it is scientific, it is not so deep but what any farmer can thoroughly enjoy it. However, it is not as simple and concise as the preceding work described.

"Milk and Its Products," by Prof. H. H. Wing, is a book that has been published this year, and is strictly up-to-date. The first chapter on the "Secretion of Milk" explains in a very clear manner just how the milk is secreted in the udder. A knowledge of this enables the milker to understand why a small amount of milk left in the udder has a tendency to dry up a cow; also why the last milk is so much richer in fat than the first, and how milk from fresh cows is easier to separate and churn than milk from a cow that is nearly dry, and why it is absolutely necessary that milking should be done regularly, etc. The next chapter is on "The Composition of Milk and Butter." Butter is a mixture of about six or eight different fats and these fats vary in amount, thus causing the difference in quality of butter. Some of these fats are volatile, and produce the different flavors. This chapter also explains the variations in quality of milk as produced by the age of the cow, period of lactation, feed and various external causes.

Chapter IV treats of the ferments and fermentations of milk and their control. It is generally understood that the fermentation of milk is caused by bacteria, or minute plant bodies. These bacteria are always present in milk in large numbers, and each form of bacteria acts upon some constituent of milk in a different form from the others. Most forms act upon the milk sugar, some of them act upon the albumen, others act upon the casein. A knowledge of these fermentations makes it possible to keep them under absolute control.

Chapter V is on "Market Milk," touching upon the treatment of milk for delivery, and the different methods of delivering to the customer. The chapter on the separation of cream is very complete, and compares the different methods now in use, the shallow pan, the deep pan, separator, etc.

There is a paragraph explaining the action of the centrifugal separator very clearly and concisely, showing why it is possible to get a more thorough separation than by the gravity method; the conditions affecting the relative amount of skim milk and cream, etc. This chapter gives the reader a very clear idea of the principles involved in separating milk by centrifugal force.

The chapter on "The Ripening of Cream" is very complete. The cause and production of the different kinds of flavors is explained. The use of a test for determining the degree of ripeness is also described; the effects of churning cream of different degrees of ripeness; the effects of overripening, etc.

The chapter on churning treats of the temperature and the nature of the agitation, etc. I quote the paragraph on "The Quality of the Globules of Fat": "The quality of the globules of fat, both as to their size and character, bears an important part in the phenomena of churning. So far as the hardness or softness of the fats are concerned, this has already been treated under the effect of temperature, but temperature is not the only influence which causes variation in the hardness or softness of the fat. The relative proportions of hard and soft fats vary considerably. When the soft fats predominate, the churning is easier than when they are in less proportion. The size of the fat globules also bear an important part in the ease and time required for churning. In passing through a mass of liquid, two large globules are more likely to hit each other than two small ones."

There is a paragraph treating on "difficult churning," giving the conditions which often arise under which it is very difficult, or almost impossible, to cause the butter to unite in granules. The chapter on "packing butter" covers the entire process of working, salting, washing, etc.

There are several chapters on cheese-making. In the appendix is a list of very useful rules and tests. For example, the litmus test: a method of determining whether a liquid is acid or alkaline; in acid solutions, blue litmus turns red; in alkaline solutions, red litmus turns blue. To change degrees F. to equivalent degrees C., subtract 32 and mutiply by 5-9: e. g.: 98 degrees F.—32 = 66 x 5-9 = 37 degrees C. The legal standards for milk in the different States is given; the various dairy laws, the oleomargarine law, etc.; also the filled cheese law. There are several pages of references, giving the title of the various bulletins, etc., touching upon subjects referred to in this work. This enables the reader to further investigate any particular point which he may desire, by simply obtaining the bulletins on that subject, which are sent out free of charge.

The "Chemistry of Dairying," by Prof. Harry Snyder, is also a work published this year, and I consider it about the best thing out. The name would suggest something scientific. This, however, is not the case. The work is very simple and concise. I believe if every dairyman knew just what is in it he would buy a copy of the work at once. The chapters are brief and to the point, and at the close of each chapter is a page of references, thus enabling the reader to investigate further. The first chapter is on the "Composition of Milk," "Testing Milk, etc.," "Ripening Cream," "Pure Cultures." The chapter on butter-making treats of composition of cream, loss of fats in butter-making, in skim milk and buttermilk. There is a chapter on cheese-making, showing the chemical reaction on the different components of milk, during the process. The miscellaneous compounds of milk are fibrin, tyrotoxicon, gases, etc. I will quote a paragraph on the color of milk: "The color of milk is imparted by a chemical compound and is not due to either a high or low per cent. of fat. The coloring matter which imparts to milk its yellow color and also gives the color to butter, whey, etc., is a nitrogenous compound called, by Blyth. 'lactocrome.' The amount of this coloring matter is influenced by the food consumed, and also by the special peculiarities of the cow. There is a marked difference in the color of milk from cows fed on the same food. Frequently a yellow-tinged milk will show a smaller per cent. of fat than a milk of a lighter shade."

"Dairy Salts."—"There is a great difference in the quality of dairy salt, due both to a difference in chemical composition and to the physical properties of the salt. The salt particles range in size from large blocks known as rock salt, to a fine powder that gives a smooth surface when a knife is pressed to it. The coarse salts are much slower in dissolving, and require longer working to work in the salt, which injures the grain of the butter. Salt that is too fine is also open to as serious objections. If the butter is worked too dry, and a large amount of fine salt used, the salt will separate and form a crust on the surface of the butter. A salt that cakes or becomes quite moist when exposed to the air is not a good salt for dairy purposes. Such a salt usually contains impurities in the form of lime or magnesia."

There is a chapter on preserving milk, giving four methods, namely: (1) Application of cold; (2) application of heat; (3) use of chemicals; (4) condensing. Each of these are touched upon. There is a chapter on the composition of fodders and the calculation of rations. This chapter, in connection with the tables giving the composition of feedng stuffs, will enable any farmer to figure out his own balanced ration.

In 1893 Prof. J. W. Decker published a work on "Cheddar Cheese-Making." This is about the only late thing of the kind, and it touches briefly upon the different steps in the process, explaining the more common causes of failure, etc.

Each of the preceding books described has one or more chapters on testing milk. The Babcock test for determining the amount of fat in milk is being recognized as the standard. It is consequently unnecessary to consider any other method. The Babcock test is very simple and easily understood, and as a usual thing the directions going with the machines are sufficient for ordinary purposes. However, sometimes special conditions arise when it is necessary that a more thorough knowledge of the test be had. There have been two books published on testing with the Babcock test. One is by Schoenman, of Wisconsin University, published in 1894. This work consists of about forty pages, and is ample for the average farmer. However, it is not quite up to date, as it makes no mention of the double-necked bottle now in use for testing skim milk. A later work published at the same institution, by Profs. Farrington and Woll, is much more comprehensive and up to date. This book covers all the details, and also the results of some tests of skim milk from different separators.

The following is a partial list of the bulletins that have been published by the various Experiment Stations relative to dairy topics. No doubt some of these may be obtained by applying to the experiment stations publishing them:

Dairying and Wheat Growing in North Dakota.—North Dakota Bulletin, No. 8.

Practical Suggestions for Butter-Making.—Iowa Bulletin, No. 16.

Conditions Affecting the Quality of Milk.—New Hampshire Bulletin, No. 9.

Relative Profits from the Sale of Milk, Cream and Butter.—Report of Maine Experiment Station, 1889.

Abnormal Analyses of Butter.—Report New Hampshire Experiment Station, 1893.

Analyses of Butter.—Connecticut Bulletin, No. 106.

Analyses of Butter.—Report Kansas Experiment Station, 1888.

Butter Analyses.—Alabama Bulletin, No. 25.

Butter Analyses, Sweet Cream Butter.—West Virginia Report Experiment Station, 1890.

Butter as Affected by Feeding Cotton Seed.—Report Texas Experiment Station, 1889.

Butter Contents of Milk, as Affected by Time of Milking.—Mississippi Bulletin, No. 13.

Butter Fat, as Affected by Food.—New Hampshire Bulletin, No. 16.

Melting Point of Butter, as Affected by Food.—Pennsylvania Bulletin, No. 17.

Sweet Cream Buttermilk.—Illinois Bulletin, No. 9.

Cheese Analyses.—New York State Bulletin, No. 37.

Cream Analyses.—Report Maine Experiment Station, 1890.

Fat in Skim Milk.—Wisconsin Bulletin, No. 29.

Effect of Abortion on Production of Milk.—Report Vermont Experiment Station, 1892.

Testing Milk Cows.—Report Vermont Experiment Station, 1892.

Milk Secretion.—Report New York State Experiment Station, 1891.

Sweet Cream Butter.—New Hampshire Report, 1888.

Bacteria in Milk and Its Products.—Connecticut (Storrs) Bulletin, 4.

Creaming Experments, S. M. Babcock.—Wisconsin Bulletin, No. 29.

Creaming Milk by Setting and Separator.—New York State Report, 1891.

Babcock Milk Test.—Bulletin 31, Wisconsin Experiment Station.

Detection of Milk Adulterations.—Wisconsin Bulletin, 31.

Relative Value of Cows for Butter and Cheese-Making.—Vermont Report, 1892.

Salting and Washing Butter.—Minnesota Bulletin, No. 7.

Centrifugal Separation of Milk.—New York (Cornell) Bulletin, 39.

Cream Ripening by Artificial Cultures.—Connecticut (Storrs) Report, 1893.

Creaming and Diluting Milk.—Indiana Bulletin, 44.

The Hand Separator.—Indiana Bulletin, 44.

The Udder of the Cow.—Indiana Bulletin, 62.

DISCUSSION.

Mr. Van Norman: If I may, I would like to say a word on the subject he touched on, though not the subject of his paper—on the churning question. When we find a successful butter-maker we ought to find out how he does, so we can know how to act. The butter is in the milk. What we want is to collect that butter together. Now, a roll of butter out of doors to-day, you could walk over if you wanted to, and if there are several rolls together you can take them all apart, and they will not stick together, but in July they would run together. Why? Because of the temperature. Those are the extremes. The extremes in butter-making would be churning when it is very cold or very warm. What we want is that temperature which will make the little particles of butter stick together while churning. Your experience only will tell you what that temperature is. Why? Because, as the speaker has told you, some milk requires a higher temperature than others. The limit is given from 50 to 68 degrees. Each one of us must take our particular cream and see where it will churn the best. What temperature is the best? First and foremost, that temperature which gets all the butter out of the cream. Isn't that it? The next thing is to get all of it out at the least expense; and third, to get it all out with the best flavor. I think there is no exception to this rule, and I believe it is the only rule that can be laid down. Churn as cold as you can and get the butter out in a reasonable time. I believe that temperature which will get the butter out in anywhere from twenty to forty minutes is the best. The higher you run the temperature the quicker the butter will come, and the more butter you will have in the buttermilk. I had a churning once that required a temperature of 85 before the butter came; the butter was not soluble, but I got some butter. If you churn it cold you get more of it.

Mr. Benjamin: I want to ask Mr. Beckman what sort of reading matter he deems desirable for the average dairyman, who hasn't the time to consult these works he refers to?

Mr. Beckman: I don't believe there is a dairyman in the State who hasn't time to read Gurler's work. However, if there be one so unfortunate, the only thing he can do is to study what other papers he can get, such as Hoard's Dairyman. Gurler's work is so simple and concise it won't take any time scarcely at all.

Mr. Benjamin: Do you consider Gurler's work standard, and are we supposed as Hoosier dairymen to believe every word that Gurler says, whether it be law or gospel?

Mr. Beckman: O, no!

Mr. Van Norman: You can read it and use those parts that apply to your conditions.

President Stubbs: The next paper on the program is on

THE FEED AND MANAGEMENT OF A DAIRY HERD.

BY FRANK P. JOHNSON, HOWLANDS.

The early histories of Indiana tell us that the settlers kept cows, and during their travels about from place to place, seeking a location, they were yoked together and trained to draw the wagon, therefore doing the double duty of bearing burdens, and supplying the family with the necessaries of life. The only balanced ration was wild pea vines, wild rye, and browse. The pea vine and wild rye were rather good milk producers, both in quantity and quality, but spice brush gave it a flavor that was not altogether agreeable. Therefore before mother earth ever thought of yielding up any of the cultivated products of to-day in Indiana, the cow had plenty to eat.

Soon after my grandfather settled in Marion County, which was in 1822, on the site of the present State fair grounds, his cows discovered blue grass in an old abandoned clearing about two miles from home. So, after that, when they were turned out in the morning, they would go direct to the blue grass pasture, and from that time up to the present blue grass has stood at the head as a milk producer in Marion County and throughout the State. If the seasons would permit its growth during the entire year, there would be no use of the silo, feed mills, oil meal and other necessary expenses that we are compelled to bear at the present time, especially during the year that is about to close. For, with the exception of about three months we have been compelled to feed. I consider clover next to blue grass as a grazing or soiling crop. It can also be used in many ways as an all-year-round feed. There is no better milk producer in winter than clover hay, and many dairymen in our secton are using it in the silo.

Crimson clover makes an excellent spring pasture and a good fertilizer, but I have never used it as hay. Prof. Hickman, of the Ohio Experimental Station, states in a paper on forage crops, read before the Ohio Industrial Meeting, that they are unable at the Ohio Experiment Station to make it grow with success. My opinion is that there is only one time during the season to sow it. As it is an early plant to mature, it also drops the seed early—that is, by the middle of June. Therefore, if nature has her way, the seed should be sown by that time, or by the first of July. I prefer sowing it in the corn immediately after it is laid by, while the ground is fresh and moist. I have been sowing it three years, but failed last summer on account of the drouth. I had ten acres of it last spring that pastured seventeen cows until the middle of July. Then I had it plowed for corn, and we turned under quite a heavy growth, and I had better corn than last year, with the drouth against us.

Corn is king as a grain ration. Very nearly all the formulas we see in the dairy journals (especially Hoard's Dairyman), have the corn and cob meal as an ingredient. The old way of using it was to stand in the mud or snow with a basketful on your arm, and hand it out to the cows, an ear at a time. They called it "nubbing" the cows. That was when our mothers did the milking, and out of doors at that, and thought they were doing well if they sold five or ten pounds of butter a week from as many cows, after supplying the family.

I do not recommend keeping cows confined to the stable during the day time, neither would I turn them where the cold wind could strike them, but I would have a place large enough to accommodate the entire herd, protected on the west and north by a high, tight board fence, where they can have all the corn fodder they will pick up clean during the day, thereby keeping them in exercise while out of the stable. I believe that the same rule will work with the cow that applies to the hen, namely, plenty of exercise.

My plan of preparing corn fodder is to cut and shock it just as the husks are beginning to turn white, and by all means before frost. Husk it as soon as possible, bind in bundles with binder twine, haul and stack in a long rick same as wheat, just outside the fence, as it makes a splendid wind-brake. Feed it on as small a compass as possible, for during the summer the stalks that are left will be rotted, and with the droppings, by October you will have a quantity of manure that will surprise you. At the present time I have eight hundred shocks in one rick. I also recommend the planting of a few acres of corn very thick, to use as a soiling crop in case of drouth. I would not plant it all at once, but commence the first of May, and continue at intervals until the middle of June, thereby keeping it green until frost comes, and if you have any left draw it to the barn and run it through the cutting box with clover hay, and feed it in the mangers.

I have had but little experience in feeding oats to dairy cows, but do not hesitate in saying that it is almost indispensable in raising young stock. Although quite a number of dairymen in our section are cutting it green for hay, I believe that oats ground with corn would add to the ration materially and economically, as they can be grown or bought very cheap.

Rye is a great milk producer, but you must be very careful how you use it, especially as pasture, as it gives a very bad flavor, if used to excess. I well remember my first experience with it about two years ago. My customers began to complain of the milk having a peculiar odor, and among them were two prominent physicians, who declared the milk was adulterated, and no amount of argument would convince them to the contrary, and they both quit. The next morning I met an old dairyman, a neighbor, who had been in the business several years, to whom I related my troubles. "Why," said he, "I see your cows in the rye field as late as noon." His advice was to let them in for two or three hours early in the morning, and no more during the day. I did so, and had no more trouble, but I did not get the doctors back until about a year ago, when the man who handles my milk said that he had a certain doctor for a customer. So that is all that doctors know about adulterated milk.

Last, but not least, in my experience with dairy feed, is wheat bran, of which there is quite a difference of opinion among dairymen. As to quality, some prefer the outside hull, clear of shorts or middlings, but I am now finishing up a ton that was prepared especially without the shorts, and I must say that the results have not been altogether satisfactory. I have fed oil meal at different times as an experiment, and at the price we have to pay I cannot say that it is a profitable feed, yet I keep it on hand to use in an emergency. Situated as we are in as great a grain and grass-producing State as Indiana, I see no reason why a well-balanced ration cannot be produced from the above ingredients—one unsurpassed for quality and quantity. I do not wish to pass from the question of feed to the management of a dairy herd without giving you the formula that I have obtained the best results from, namely, for each cow averaging 1,000 pounds, 5 pounds corn and cob meal, 5 pounds wheat bran, 15 pounds clover hay and corn fodder cut in one-half-inch lengths, all placed in a tank and mixed together by adding enough water to make it quite damp but not wet; feed it so that each and every cow will take it all up clean, thereby having no feed wasted whatever. Use judgment, as some cows require more feed than others. Also give them all the fodder they will eat while out of the stable. Keep the cow full if you expect to have the pail filled.

Success with a dairy lies to a greater extent than some would imagine in the management of the herd. The cow of to-day, if bred up to the standard required of a valuable dairy animal, is endowed with a reasonable amount of knowledge, and those who handle them should have at least the same amount, or keep out of the dairy business. Practical dairying requires a great amount of knowledge, and you must put it into practice. Those who produce their own feed should know what to plant and when to plant it, and how to prepare it for the cow, so as to obtain the best results.

The dairyman who owns his own farm has an advantage over one who rents, for the building up of a paying herd requires a vast amount of time and expense, and both I consider unwisely invested when it is done temporarily. I have had some experience and know what it is. Ten years ago I bought my farm, built a house and moved on it. As I was located only about five miles from the center of Indianapolis, and having at that time eight or ten cows, I went into the dairy business. There was a frame stable on the place 20 by 20, with a haymow of about two tons capacity, and an old-fashioned hewed log house of two large rooms. So I moved them together and thought I had a barn, but after four years of laboring under difficulties, yet building up a herd of forty cows, I sold out, because I did not know a good thing when I had it. Then, tiring of selling the products of my farm for barely enough to pay taxes and live, for about four years, I went back to my old love, the dairy. Two years ago I built a barn 32 by 54, 18-foot posts, with basement under the whole of it, and with a 20-inch stone wall, and with ample room I thought to accommodate all the stock and feed necessary. After two years' experience I found I was cramped for room, and have just completed an addition to it of 16 by 54, and have no room unoccupied, as everything is done under one roof, even to loading the wagon. Therefore, as I have said before, it is unprofitable to build up a dairy herd temporarily. We have men, and even women, living in and around Indianapolis who barely know a cow from a goat, and who imagine there is a Klondike in the dairy business. So they pick up a few old, condemned cows at the Stock Yards, or wherever they can get them cheap, lean up a few old boards against a pole for a barn, buy an old castaway dairy wagon for three dollars, by paying a dollar down, and go to selling milk. The result is they survive just long enough to demoralize the business of some other dairyman and then collapse, and cry out, "No money in dairying." This has its influence, and is very detrimental. Don't understand me to say you cannot start with one cow and build up a good dairy herd, and a good business. On the contrary, I say you can, but it takes brains and money to do it. If you do not know how to select a good cow, my advice is, do not buy very many until you learn. Very few of us, however, have diplomas.

I must say that I am fond of dairying when everything that pertains to it goes as it should, with all who are connected with it working with an interest and to each other's advantage. The cow should be trained the same as the horse, to respond to the word instead of to the club. The little calves should be taught to follow you instead of running from you, and when the time comes to tie them up in the stable, do not surround them with all the help and scare them to death driving them in, but coax them in with something good to eat. Ditto with the cow. Arrange the stable so as to have the cows all together and the feed likewise. Don't build a couple of stalls here, one yonder, and the rest somewhere else, and lose valuable time and feed going from one department to another.

I visited a dairy not long since where there are about fifty cows, and I firmly believe that man was wasting as much feed as my twenty consume. It may be because he had plenty and did not know what else to do with it. It may be like the dairyman I read of somewhere in the South, when asked why he did not cull out the old unprofitable cows and banish them from the herd: "Why," said he, "I wouldn't have anything then to eat my fodder."

Avoid loud talking and especially rough language at milking time, for the intelligent cow is very easily excited and, as a rule, when one starts, it passes all around, and that means a shortage of milk. Feed and milk at regular hours and be prompt with your customers if you deliver to the city trade. Do not keep the cows in the stable, except at milking time, cold nights and extremely stormy days. Keep the stable clean and well ventilated. Use plenty of whitewash on the walls and stalls and slacked lime on the floors.

There should be a record kept of the entire herd, each cow separately, giving name or number, when she dropped her calf, when bred, and when she became dry; also the weight of her milk night and morning, and at regular intervals of one day out of each week; also the kind of feed, the amount and how prepared, also her condition. This being done, you will find it a very easy matter to look over your records, and see whether or not there is need of any weeding out. This is easy to determine, as you have the amount of feed she has consumed and the amount of milk produced.

A paying dairy cow should go about eighteen months between calving, and produce from eight hundred to one thousand gallons of milk, and at the present prices of feed she should not cost over twelve cents per day for her keeping. Bear in mind that depends altogether upon how she is managed. The cow running wild on the prairie barely raises her calf, but domesticated and properly managed, will do that and keep a family of six in milk and butter.

In conclusion, I will leave the selection of breeds for you to determine. Some prefer one breed and some another, but after forty years' experience I would rather have a good Jersey cow than her value in cash.

DISCUSSION.

Mr. Beckman: Do you state that a good dairy cow ought to go eighteen months between calves?

Mr. Johnson: I think it is much easier on the cow, and I think she will produce as much milk, if the proper care is given her.

Mr. Beckman: Wouldn't it be better to wear out the cow as soon as possible and get another?

Mr. Johnson: Not a good one.

Mr. Beckman: Would it not be better if you can get as much good out of her in twelve years as in fourteen?

Mr. Johnson: I don't think you can do it; I have a cow I have been milking fifteen months, and she is giving between 15 and 20 pounds of milk a day now.

Mr. Beckman: Such cows are good ones, but wouldn't it be better to have them have a calf every year, and let them give the number of pounds they are giving in ten months instead of thirteen?

Mr. Johnson: Possibly it may be in some eyes, but I can't look at it that way. When I have a good cow I like to keep her as long as possible, and by my records, where I show them running eighteen months, I show better results than where I let them go only twelve.

Mr. Beckman: Don't you think the cow would last longer if she is not forced so hard?

Mr. Johnson: Sure.

Mr. Beckman: You certainly don't advocate forcing them?

Mr. Johnson: I don't aim to force the feed into the cow; I give them all the feed they can eat; I don't aim to force them either in feeding or breeding.

Mr. Beckman: Don't you think it better to crowd her up to 250 pounds of butter, and have her wear out that much sooner, than to let her give 200 pounds and wear that much longer?

Mr. Johnson: No; I think my way is best; I don't believe in wearing out anything that is good. [Applause.]

Mr. Woods: Do you raise your calves?

Mr. Johnson: I raise all the heifer calves from the choicest cows.

Mr. Woods: When you have a good cow, why don't you do it oftener?

Mr. Johnson: They come in fast enough.

Mr. Van Norman: Why not spay the cow and not be bothered with calves?

Mr. Johnson: That is a question I cannot answer.

Mr. Moore: It is like the gentleman said about the temperature; certain cows it will do to breed this way. I have a Jersey cow in my dairy. whose calf is almost a year old, and she is giving me right close to five gallons of milk a day. Now, I don't want to breed that cow too often, and we are not forcing her either. Let your judgment be the guide in each case; study your herd.

Mr. Woods: Did I understand you to say that you have your cows out in all severely cold weather, at night?

Mr. Johnson: Yes, I keep them out extremely stormy days and cold nights. I don't like a hot-house cow any more than a hot-house man. I don't put them out in a bleak field where the wind strikes them; I have a place protected by a hill and a high fence and a rick of corn fodder. I make them stay there all the time.

Mr. Woods: Yes, and without it is an exceptionally warm day, or if it is a cold day they will be back in the shed, as soon as they can get a drink and get back.

Mr. Roberts: I think Mr. Moore has touched the keynote with reference to when a cow should be fresh. In handling cows we get nearly all kinds, and there are very few cows in this country that go over two winters and give very much milk. The average cow in this country has to be fresh about once a year if she is going to give very much milk.

Mr. Payne: There is a divided crowd here to-day. There is a crowd here selling milk to the dairy, and a crowd hauling milk to the creamery, and there is a divided question here before us now. We people who are breeding cows to haul milk to the creamery, want our cows fresh in the fall, every one of them, from September on until this time of the year, and then we get the very highest price in the winter. We can milk in the winter time when we can't plow corn, and we can haul milk to the creamery when we can't plow corn or pull weeds. In the summer time milk is down to the lowest price. I have a cow five years old. When she was two years old in December she had a heifer calf, the 15th of December, and the next December, on the 18th, she dropped a heifer calf, and this December, the 20th, she dropped me a heifer calf, and this oldest heifer calf last June dropped a heifer calf. I want to know if that kind of a cow is profitable. This heifer calf is giving a gallon of milk now at each milking, and the old cow is giving 40 pounds a day of milk.

Mr. Benjamin: I would like to ask Mr. Johnson if he finds any failure to breed where he lets a cow run eighteen months?

Mr. Johnson: Yes, it is very apt to terminate in that way, and they will go dry a little longer, but when they do come fresh I think they pay up for all loss.

Mr. Payne: I was telling a gentleman in Newcastle the other day about this cow of mine, and he said he could beat that. He said he heard a man say once that he had the best cow on earth. He said she never had a calf, neither did her mother. [Laughter.]

President Stubbs: It will now be necessary to close the discussion of this interesting subject. We will now listen to an address on

PASTURES AND FORAGE PLANTS FOR DAIRY CATTLE.

BY J. M. T. WELBORN, BRIDGEPORT.

When we consider that Indiana has of grasses alone fifty-one varieties, aside from forage plants, we see that to give all a place would be more than could be done in a brief paper.

Grass is one of nature's greatest gifts to mankind. The dairyman must have pasture for his cows, if he expects to succeed; and, of course, he wants the very best. So I would say for permanent pasture, Kentucky blue grass—no; Indiana blue grass; for General Harrison in his early history says, when traveling in Indiana with his army nearly a century ago, he found a very luxuriant grass in this State, that surpassed anything to be found anywhere else. He also makes the statement that his horses did exceeding well while here. Henry Clay comes up and makes an honest confession, and states that Kentucky not only stole the grass, but the name also. So it is our grass in fee simple, and without question the very best grass for permanent pasture of all of the fifty.

I would not confine the pasture to one grass alone, as good as it may be, but combine with a number. In our pasture we have blue grass as a basis, freely mixed with clovers, both common red and white; also timothy and quack grass, though the latter is there without permission, yet it seems to fill an important place. Clover is not classed with grasses, neither is corn a forage plant. So permit me to change the order of things to suit the Indiana dairyman, and put clover with the grasses and corn with forage plants.

If we depend on one grass alone, our pastures, of necessity, will be short at certain periods of the year, as all grasses have their time of ripening. Blue grass is both an early and a late grass; in fact, it grows all the year if not too cold or too dry. But if we depend upon that alone, we will not get the best results, as in case of drouth or other things that we may have to contend with. It has been demonstrated that mixing seeds of grain will give a greater yield than could be obtained from one alone. So likewise with grass, and preventing the danger of bloat or hoven to a great extent.

Peter Henderson recommends a combination of grasses, and I have been informed by a friend of mine who visited a pasture in New Jersey, seeded by his formula, that it was an exceedingly fine pasture. The writer has seen old pastures renovated on rather thin and worn land, and by careful attention their production has trebled. It has been said that "he who makes two blades of grass grow where only one grew before, is a benefactor to mankind." Let me add, "He who does this and utilizes what he grows, so that it doubles in value, he has increased more than four-fold."

Ex-Governor Hoard set the high ideal a few years ago, that a cow ought to produce three hundred pounds of butter per year, and that she ought to do this on the product of one acre of land. The former proposition has been reached and surpassed; the latter not that I know of—not in our vicinity at least—and we think we are in sight of the possession. Our wealthy cattle raisers of Hendricks County count their acres and divide by five, and buy so many steers. Or, in other words, they allow to each head of cattle five acres of grass. I would not recommend so liberal a policy as that, where land is scarce and valuable. The farms of central Indiana have been divided and subdivided until we are not situated as the man out in Texas was, when he thanked God that his nearest neighbor was seven miles away.

For a dairy of twenty cows I would want at least ten acres in permanent pasture, and in rotation of crops can use other parts of the farm as conditions will permit. Let me say, by all means locate your pasture convenient to the barn, so you and your cows will not have to spend valuable time traveling to and from the barn, to say nothing of the loss by shrinkage of the milk and butter by traveling through the broiling sun; for if the pasture is only one-half mile away, and you make two round trips each day for 365 days, you have traveled 730 miles, too great a journey for a dairy and dairyman to make. Think of driving your dairy from Cincinnati to St. Louis, and return, in twelve months, and you have some idea of what a dairy has to contend with, referred to above.

The pasture should have a skirt of wood for shade, if possible. If not, your cows should be provided with shade, either by an open shed, or have them stabled through the day, as a protection from the sun and flies. I have thought seriously of adopting this plan, as we always stable the cows when we milk, and feed some commercial feed with green crops or silage. I think it good economy from every standpoint, to prevent bloat or hoven, which is the dread of dairymen. We have not had a case at our barn since we adopted that plan, and as I know of no other infallible remedy for this disorder, I set it down to the credit of mixed pastures and feeds. We would not think of milking otherwise, no more than I would think of putting a whole dollar into the collection box at church. We think at our place that it is a good plan to sow all of our corn land in rye, so as to have early pasture, and also use it as a cover crop through the winter, and turn under what is left to fertilize the land.

So far I have only touched on pastures. For forage in the form of silage, in my opinion the most economical of anything I have tried, is our common corn, though there may be some objections to this at all times. If the pasture is fairly good, the cows will not eat enough to keep the silage in a good condition, if the weather should be very warm. So it is wise to make provisions that will meet the conditions. Rye makes good early pasture, or may be used as a soiling crop. Early peas are good. Sweet corn is relished by the cows, and is very nutritious. Where it is convenient to market, there may be one acre or more planted, and the ears plucked and sold at a good profit, and the refuse utilized by the dairy, which will be relished by the cows. Of course the cows would not object to the ears being left on, but as a matter of economy, I would do otherwise. Sugar beets are a most excellent feed, and one that is satisfactory at the pail, but the matter of cost must be considered. So we have dropped them as food. Kaffir corn is a fairly good soiling crop, though all things considered, we leave that out of the list.

We would recommend every up-to-date dairyman to experiment on his own farm in a small way, if not otherwise. You may say that is what they do at Purdue. Sure enough, but you may learn something that they do not, as your farm may be different from theirs, and other conditions to be met. I would put on the experimental list sugar beets, rutabagas, and mangel-wurzel. I would say that to handle a root crop successfully here in central Indiana, will require a cellar or some other receptacle that is frost proof. Crimson clover is good if you can succeed in getting a crop. Soy beans are highly recommended, if they can be matured this far north. Touch light until you know. Rape is another good forage plant. The objection to this is it might make the milk have a bad flavor. A neighbor of mine pastured his cows on a plat of rape the past season, with good results. He gave the milk and butter a careful test, and pro-

nounced it all right. If this should prove true, under any and all conditions, it certainly will be valuable as a dairy food, as it can be sown from March to August, and is a rapid grower, stands drouth well, and furnishes abundance of forage.

There are others which are worthy of a trial. If we depend on others to do all of our experimenting for us, we are doomed to disappointment.

I cannot close without a few things in regard to what should not be in the pasture. No one, only a poor man, can afford to have in his pasture more thorns, thistles, weeds and briars, than grass. In fact, it is good economy to hire a good man to take out everything that will not make his cows happy, and the dairyman, too.

It has been the practice of some dairymen to wear stout boots, so that when they unfasten their cows, they can give them a good start to pasture, and then keep a good dog to send after them for the next milking, or a boy with a good pair of lungs and a pony, and a whip to send along, and to be sure the cows are at the barn on time, they start early and hurry them, which ought not to be.

I close by quoting a French writer. He says that grass is only another name for beef, mutton, bread and clothing. No grass, no cattle, no milk, cream or butter.

DISCUSSION.

Prof. Smith: I would like to know how many in the audience raise alsike clover, and how does it succeed?

Mr. Benjamin: My experience has been limited with it. I tried it on low ground; I was told that was the place to try it. The first year it did very nicely; this year it dried out for me.

William Macey: I sowed alsike clover last year in wheat, late in the fall, and this year after I cut my wheat it came on, but the late dry weather seemed to affect it.

Prof. Smith: Has anybody experimented with alfalfa?

Mr. Woods: I have; it has been some time since we tried to grow it. We sowed it on high sandy land. It grew in the summer time, and was killed out in the winter time.

Mr. Gottschalk: I have been raising alsike clover for some time, and I want to say that I have never cut any of it, only where it was mixed with timothy, for hay; it is an excellent feed, and I have one piece I have been mowing for six years. I sowed it in timothy and alsike clover six years ago, and I got a good crop of clover mixed with timothy this harvest. This is my experience with alsike clover.

Prof. Smith: Our experience, you remember, is in Michigan. This alsike clover, while a little treacherous, is excellent for low ground. This year we had a field of 34 acres on the college farm, and we pastured on it a herd of 18 head of cattle through the season, and on the 24th day of June we harvested 35½ tons of good, nice clover hay from the 34 acres. That was sown also with timothy. Where we have tried alsike clover on high land we have not had good results. We have had very poor results with alfalfa. For two years it would maintain itself, and then the winter would kill it. The old sheet anchor in Michigan agriculture is the red or mammoth clover. This year we made an experiment with some of this clover grown there. We washed it out with the hose, leaving the tops and the roots. In the tops per acre there were 132 pounds of nitrogen, and in the roots 63 pounds of nitrogen. It would have taken seven big two-horse loads of manure per acre to replace the nitrogen in the roots of the clover, and that is the reason we swear by the clover. The clover gets this nitrogen from the air, and in this way it is taken directly to the soil. In my estimation red clover is the best feed for us dairymen to use, and in the second place we should stand by it because of its manurial value to the soil.

Mr. Stubbs: What is the difference between common red clover and mammoth clover?

Prof. Smith: The mammoth clover is simply later, and is larger, as the name implies.

President Stubbs: How does it compare in value as a feed?

Prof. Smith: We find that the mammoth clover is not eaten quite so clean.

Mr. Nixon: Do you feed it to sheep?

Prof. Smith: Yes, and to cows; but our conditions are so different my advice might not be worth a cent to you.

Mr. Billingsley: Isn't that low land on which you raise your clover well underdrained?

Prof. Smith: Yes.

Mr. Gottschalk: Isn't the mammoth clover what we call the big English clover?

Prof. Smith: The very same.

Mr. Nugen: I want to ask in regard to the worm that feeds on clover; does it come from raising clover? I have had some experience in fields set in red clover for five or six years. There seems to be something that works on it, and kills the clover out.

Prof. Smith: Does it work in the root?

Mr. Nugen: Yes, and I wanted to ask the question whether that was brought about by the raising of clover, the same as in the raising of wheat or something of that kind?

Prof. Smith: I don't know.

Mr. Knox: Has the English clover the same value as a green crop to turn on as the little red, or, in other words, will the cattle do as well on the big English as the little red?

Prof. Smith: Well, I can't answer that question positively. I should think it would to turn on it very soon and get it pastured down, otherwise it gets large and woody.

Mr. Knox: That question was discussed last year in our Institute. We had one farmer who claimed the big English was not as satisfactory a crop as a pasture crop, from the fact that the cattle would leave the big English standing, and graze on shorter grass, and that it would not produce the fat that the little clover would.

Mr. Wright: I have had some experience with the different kinds of clover in the same field. As the mammoth clover is the earlier, it was becoming hard when I turned on it; the stems were becoming woody, and the little clover on the other side of the field was in prime condition for the stock. That may be the cause.

Prof. Smith: If that clover dies and you plow it under you get as much manurial value out of it as if you plow it under green. If you are going to plow under the clover at all, then I advocate that you plow it under at full growth, but I would rather recommend the cutting of the clover and feeding it than plowing it under.

Mr. Wright: Do you mean the English clover the same as the red clover?

Prof. Smith: Yes.

Mr. Wright: How many keep up the cows on silage through the summer?

Prof. Smith: I have found the nicest way; I would not care to have this published. The nicest way is the summer silo, that is a silo made so small in horizontal area you will feed off two inches deep—you will feed off six square feet per cow. I don't know that I care to have that considered as authoritative, as I am not a dairy authority myself. I have found out by experience if I can have my silo small enough in horizontal area to feed off two inches a day. I can feed down then so it won't spoil, but if I have a great big silo horizontally, the silage will spoil, and then I kick on the silo.

Mr. Wright: That depends on the number of cows.

Prof. Smith: I said six horizontal feet per cow. How many have put clover in the silo?

Mr. Dunham: We didn't cut it up. We put it in without cutting it up. It didn't pack well enough to keep well.

Prof. Smith: We put it in without cutting and it kept splendidly. It is easier to let the sun dry it out than to draw it to the barn. I tell you it is hard work to pitch green clover on a wagon, and pitch it into the silo. That is the worst fault I have with it; it keeps well and feeds out beautifully. How many raise millet?

Mr. Woods: The millet is all right and the cows like it. I shipped some of this milk to Chicago and the milk man said: "There is something the matter with your milk." I told him that I was feeding millet, and we concluded that it did not give the milk a good flavor. When we are a little late planting corn we sow the millet, and we use the German variety. When very late we sow Hungarian grass. Do not feed your millet hay to horses. If you let it grow long enough for the seed to get to dough, it acts on the kidneys of horses. I have found, in North Dakota, where they feed millet, that it is dangerous to horses where it is allowed to mature until the seed is dough.

Mr. Payne: I have fed millet, and I have noticed that the stables are harder to keep clean when using it than when using rye. Rye is a far better feed cut after the bloom drops.

Prof. Smith: Is rye a better feed than millet for cows, if the rye is cut just after the bloom?

Mr. Moore: My cows won't eat it. They just smell it: that is all.

Prof. Smith: Probably neither the cows nor the owner use the rye in any form. (Laughter.)

Mr. Yoars: Rye should be sown very thick, so it will not grow coarse, and then it makes an excellent hay. As sown ordinarily, one bushel to the acre, the straw is too coarse, and horses won't eat it at all.

Mr. Payne: Last season I sowed a field of millet of 15 acres. I put that in the barn just after the seed began to shatter. It was my first experience, and I consulted my neighbors as to when to cut it, as they had raised it. I found out it was hard on horses and cattle both, when feeding it. Then I took cultivators and cultivated it one way, and harrowed it and drilled it the other way in rye, and just as soon as the blossoms dropped I put it in the barn. To stand off and look at it you could scarcely tell it was not timothy. Any stock on the farm will eat it.

Mr. Armstrong: I would like to ask Mr. Smith with reference to sowing millet. He said as late as the 20th of July. Did he mean that or June?

Prof. Smith: I meant July. We sow in Michigan as late as the 12th of July, and we get a good crop. My advice is not worth anything here. Your conditions may be different. If you have a drouth about the first of August, your millet seed may lay in the ground and not sprout. If I were to come down here I would read the bulletins from Purdue, and I would inquire around and see who is the most successful dairyman, and I would go and do as he does.

The Secretary: Mr. President, at this point I desire to call the attention of the Association to several communications which I have received for presentation to this body. I do this now that they may be referred to the Committee on Resolutions if so desired. The first is from J. B. Dinsmore, of Nebraska, and is as follows:

"Sutton, Neb., December 16, 1897.

"C. S. Plumb, Esq., Lafayette, Indana:

"Dear Sir—Will you kindly read the following letter to the Dairy Association at their annual meeting:

"The Trans-Mississippi and International Exposition to be held in Omaha, in the summer of 1898, will, among its different departments, give a grand dairy display. It is the object of the exposition authorities to make the dairy department one of interest, wherein exhibitors of all grades of dairy products may present their goods for inspection and comparison, and where the dealers in dairy supplies may present their goods for inspection of those interested, as well as intended purchasers.

"I hereby extend an invitation to all parties in Indiana who may be interested in dairying or its products, to become exhibitors at this exposition, and compete with their brethren of the West for a determination as to the value of the products of the different sections. While we are not a large consumer of dairy products, we are rapidly coming to the front as manufacturers of dairy products, and the day is not distant when the influence of this Trans-Mississippi country will be felt in all the dairy markets of the United States.

"Respectfully yours,
"JOHN B. DINSMORE,
"Com. Live Stock, Dairy and Poultry."

I have another communication, which is from Mr. C. Y. Knight, Secretary of the National Dairy Union.

"Chicago, December 28, 1897.

"To the Members of the Indiana Dairy Association:

"Your colaborers in the National Dairy Union have passed laws in the State of Illinois during the past year, which will drive the yellow oleomargarine fraud from the State. Already the manufacturers who are being driven from Illinois are preparing to resume their business on Indiana soil, feeling that the dairy interests of your State are not sufficiently strong to combat with them.

"However, the National Dairy Union is strong, and will aid the weaker States. We urge that you take steps at once at this meeting to pave the way for work at your Legislature which will assemble at Indianapolis next winter. Form a State Dairy Union, with president, vice-president, secretary and treasurer, as a nucleus around which to work, as it will be too late to act at the next meeting. We will be prepared to step in and fight with you a year hence, and drive the fraud from your State as we drove it from Illinois, and as we drove the filled-cheese fraud from the country.

"We expect to carry the fight into Indiana and Kansas next year, and desire that you be prepared to work with us.

"Yours for the good of dairying,
"CHAS. Y. KNIGHT,
"Secretary of the National Dairy Union."

Mr. Monrad: Now, you understand the National Dairy Union can not, as such, come into Indiana and interfere with your law-making, but if you form this local Indiana Union they can come and back the State Union up, and that is what Mr. Knight wants you to do.

The following letter from the Secretary of the Ohio Dairy Union was also read by Secretary Plumb:

"Cleveland, O., December 28, 1897.

"H. C. Beckman, Secretary, Lewisville, Indiana:

"Dear Sir—I beg to call your attention to the enclosed resolution, which was adopted by the Ohio Dairy Union at its annual meeting in this city, December 7th, and to request that the same be read at your annual meeting, soon to be held.

"The close relationship of Ohio and Indiana makes it especially desirable that the dairy legislation of both States be to the same end, that the violators of the laws and the despoilers of our markets for pure dairy products cannot have refuge and outlet for their product from one State to the other.

"We also urge to your attention the fact that the internal revenue regulations regarding the branding and sale of oleomargarine are in many districts in the hands of the enemies of pure dairy products, who, either through incompetency or bribery, refuse to see constant and flagrant violations of all the vital regulations of the law, robbing the statute of its main purpose and intent—protection from this fraud to the producer and consumer. It is a prolific field for investigation, and doubtless attention to it in Indiana will reveal to the dairy interests slack enforcement of the law, if not corrupt knowledge and collusion between the oleomargarine interests and the deputies of the several districts.

"We have found in this district shameful disregard of the regulation requiring the stamping of all retail packages, which has made it easy work for the retailer to sell oleomargarine for butter, in many instances obtaining the highest creamery price. The large profit thus obtained has been a great temptation to the retailer who has bent all his energies to the fraudulent sale of oleomargarine, which was encouraged and made possible by the non-enforcement of the branding regulations of the national law. We found retailers selling ten pounds and over in original packages, contrary to law, and a general disrespect for the law, except in the taking out of licenses, which is, without doubt, in instances, also disregarded.

"We call your attention to the fact that disrespect for law is not generally tolerated in the revenue and other departments of the government service, and that this exception in the case of oleomargarine matter should not continue with the consent of the dairy interests of the country, but on the contrary should be investigated by competent friends of the dairy interests, and if found slackly or dishonestly administered in any district, protest should be made to the collector and to the secretary of the treasury.

"The law was enacted for the protection of the producer and consumer, and the dairy interests neglect their most effective safeguards and protection when they neglect to look after and demand the strict enforcement of the national revenue regulations regarding oleomargarine.

"Our protests in this district have been promptly acted upon by the collector, and large numbers of cases of all descriptions have been made against the dealers who have, for the present at least, been compelled to strictly adhere to the law, fully substantiating our claim that there was either gross incompetency or corruption with the deputy whose duty it was to look after the enforcement of the law.

"If you are interested in maintaining the butter markets of your State for butter, and holding oleomargarine within its honest and lawful sale, we hope that you will not underestimate the value of the national law, nor fail to interest yourselves in knowing whether it is being enforced or, as we have reason to believe, flagrantly violated.

"I would be glad to have from you proceedings of your meeting, and will be pleased at any time to give you information regarding our crusade on the above-mentioned abuses.

"Yours very respectfully,
"F. A. STRANAHAN, Secretary."

Following is a copy of the resolutions adopted by the Ohio Dairy Union at its annual meeting at Cleveland, December 7, 1897:

"We protest against the use of oleomargarine in national institutions, and particularly in soldiers' homes. The veterans of the civil war are certainly entitled to the same quality of food that is found upon the tables of the governors and managers of these institutions. To refuse to allow pure dairy products to compete on contracts for supplies, as in the Dayton Soldiers' Home case, is to discriminate against a struggling industry of the people, and we demand that Congress shall pass a law prohibiting such discrimination.

"In order that the Dairy and Food Commissioner may not be handicapped in the prosecution of the work he has been elected by the people of the State of Ohio to do, we urge upon the General Assembly a liberal appropriation of money for the use of this department of justice, making ample provision for all necessary expenses incurred in making arrests, and in analyzing samples of supposed impure food products, and in prosecuting offenders.

"The attention of the treasury department is called to the fact that the internal revenue law regulating the sale of oleomargarine is not strictly enforced, and in certain districts is openly and flagrantly violated. The law was passed by Congress to protect the dairy interests from fraudulent competition, and we insist upon its strict enforcement. To place the enforcement of this law in the hands of its enemies is simply a betrayal of the dairy interests.

"The interests of the producer in this contest of pure dairy products against imitations are the interests of the consumer. A fraud upon one is a fraud upon the other. We would warn the people of all our cities and large towns of the very prevalent sales of imitation butter, and of the necessity of constant watchfulness, demanding and getting what they pay for, and not accepting without protest a cheap and doubtful imitation.

"We respectfully insist that the members of the Seventy-third General Assembly do not recommend any changes in our present dairy statute, except such as are calculated to make our dairy products such as will commend them to the people at large, and discriminate clearly and forcibly against all substitutes and imitations, to the end that our agricultural classes, who help maintain our State government, may have the revenue that their dairies should produce, in preference to the manufacturers of adulterated and imitation goods.

"We request the co-operation of sister States in the contest against adulterated dairy products, and especially request the dairymen of Indiana to secure the speedy enactment of laws regulating the sale of oleomargarine in that State. Effective protection can only be secured by a solid phalanx of all the States working for the same purpose."

Prof. Plumb: On yesterday I called on one of the dairy commission houses of Indianapolis, and one of the proprietors told me that they sold twenty tons of oleomargarine a month. It is not one of the largest houses in Indianapolis; it is what I would call an average-sized one. I asked him if there was an enforcement of the law. He said that in so far as the retail dealers were concerned, he thinks that is the case, but when it goes beyond the retail seller to the consumer, the consumers are not made aware of what they are eating. As I travel here and there in the State, I find in most hotels they are using oleomargarine; at least, I am reasonably convinced that it is not butter. Every once in a while a letter comes to Indianapolis addressed to the Pure Food Commissioner of Indiana, and I think nearly all of those letters are forwarded to my office at Lafayette, and most all of them ask about our dairy laws. You might as well say we have no dairy laws, and the result is our doors are wide open at present. Certainly there is no question about the necessity of doing something so that at the next session of the Legislature there will be passed a bill along this line, as the importance is very great. It seems to me that we should organize in this State a State dairy union, which can co-operate with the National Dairy Union, and I therefore move that these matters be referred to the Committee on Resolutions. This motion was carried.

Convention adjourned at 4 o'clock p. m., Wednesday, December 29, 1897, until the evening of the same day at 7 o'clock, at which time the session was called, the church being crowded, and after music by the Lewisville choir, the following proceedings were had:

WEDNESDAY EVENING SESSION.

The evening session was opened by the President delivering his annual address.

PRESIDENT'S ADDRESS.

BY O. A. STUBBS, LEWISVILLE.

It is indeed a fitting thing that we, as citizens of the great State of Indiana, should meet in this, the eighth annual convention, for the purpose of both giving and receiving instruction in that branch of agriculture in which a large number of us are directly interested.

This association is the result of the combined efforts of a few earnest, wide-awake men, who saw the need of those who were following this branch of agriculture, to organize themselves into a body that more effectual and systematic means might be employed to place before the farmers of this State the latest methods, as well as the scientific knowledge which render practical our modern dairying. The dairy interests of Indiana are making rapid strides in advancement, both as to quantity and quality. Our butter and cheese is no longer made by the guess rule, but direct and explicit rules and formulas are carefully followed that the manufactured article may be one of merit. Then when this product is placed on the market, or in competition for a prize, it scores with that of other States and older States in the business than we are, and commands a price equal to the best. This is a position our State has not attained until recently,showing that intelligence is required to direct any industry where its products come in competition in the great markets of the world. This knowledge, too, has been disseminated to a greater or less extent by this organization. At its annual meetings we have learned from the most practical and experienced men something of the hows, whys and wherefores in the business. There is no reason why the young men who expect to be farmers, and all young women who think of becoming the wives of these farmers, should not take a course in agriculture and household economy at Purdue University. It is intelligence that is sold at a premium. Were it not for this factor, which is capable of being expanded and enlarged in many ways, we would be, of all creation, most miserable. It is this factor, pursued in given line, which has given us the great draft horse, and in another direction, that has given us the wonderful two-minute rate of speed. It is this same intelligence, directed in another line, that has given us to-day the typical dairy cow, and it is this same agent, wrapped in a pound of butter or cheese, that commands the fancy prices that all producers so much desire.

No doubt most of us read the announcement of our convention in Hoard's Dairyman, and, judging from the editor's comments, he thinks the dairymen, the people who care for the cows, are in great need of light. He tells us that the dairymen of Wisconsin and Minnesota are making money per cow and consequently per acre, and we hope to learn from Prof. Hacker just how this is done. The most indifferent student is he who does not see the need of education. We have but to examine the statistics of the State to find where we are. While the market price of butter and cheese has suffered in common with that of all other commodities in the past few years, I believe we are approaching something near the former prices. However, these times of low prices should not leave us without an object lesson. If we made a profit then, it will surely be a greater profit in times of high prices. The market has advanced very materially in the last six months, owing to a number of causes. The agricultural department at Washington is doing for the dairy interests of the United States that which has never been attempted to any great extent before, and from the knowledge gained from that department it gives us as producers an insight to the demands of a people, to which we must cater, if we wish them to become consumers of American butter and cheese.

In all the leading dairy States oleomargarine and butterine have been unmasked and compelled to stand on their own merits, and we have rejoiced with them in their much prized victory, and while we were in our ecstacy, before we were aware, the fraudulent manufacturers had pitched their tents on Indiana soil, and were continuing their nefarious work. Owing to the fact that our legislature will convene soon after our next meeting, I would approve of a committee being appointed at this meeting for the purpose of drafting a bill to be presented at the next session of our legislature, and otherwise looking after the dairy interests of the State, and to secure the appointment of a State Dairy and Food Commissioner. The dairymen of Illinois deserve much credit for the fight they have waged against the manufacturers of imitation dairy goods, notwithstanding the moneyed men were on the side of the fraudulent perpetrator. The dairymen of Indiana are no less persistent than those of our sister State. We cannot afford to be behind in making our wants known, and pushing with all the energy our situation demands. It is with much pleasure that we report the substantial appropriation granted us by our last General Assembly. This was not brought about by the work of any one or two persons, nor by the committee that was appointed at our last meeting, but all who were interested had something to do in obtaining the appropriation of $500 to this association. In the past it seemed, at times, that we should fail, owing to a lack of funds, to carry on the work of the Association, but now all fear is abandoned, and we are now in a position to do more effective work for the dairy farmer than ever before. In lieu of this fact, I think the executive committee-elect should show the next legislature, in some way, our high appreciation of their generous appropriation.

We have just begun to know something of the magnitude of dairy farming. It requires great diversification and rotation of farm crops, that we may retain all the fertilizing elements possible on the farm, and at the same time produce some money-making crops. The dairy farmer has more resources from which to draw than he who simply raises wheat, corn and hogs. The wise dairyman knows the kind of a cow to keep, of whatever breed she may be. She must pay for her feed and leave a profit for her owner. To know this, more than guess rule must be applied. The milk must be weighed, tested, the butter computed at the price received, and from this must be taken the total cost of feed. These are simple problems, and any one can ascertain whether his cows are making him a profit, or are costing him something that has been earned in another way. To know this, brings about another commendable feature of the business, and that is the keeping of systematic records, not only of the cows, but of all the business transacted. By this means we may know, without doubt, the results of our work. Farming is no exception to other kinds of business, and requires the same accurate business methods of showing profit and loss in every department. The farmer who has knowledge, gained from his own calculation, based upon records of his farming transactions, has a great advantage over his neighbor who works blindly on, trusting to good luck. Let us try to improve in all our farming and farm dairying, and we will not only be remunerated in money but in the fertility of our lands, and it will enable us to make better and more substantial improvements on our farms, and enable us to be better citizens of this great State of Indiana.

THE COST OF PRODUCTION.

BY PROF. T. L. HACKER.

Minnesota Agricultural Experiment Station and Dairy School.

It is indeed very gratifying to me to face such an audience on an occasion like this. It speaks well for the future of the dairy industry of Indiana. I have had the pleasure of visiting several States this fall, and I am free to say this is the finest audience I have faced this year. [Applause.] My little talk this evening is on the cost of production; what it costs the farmer to produce one hundred pounds of milk or a pound of butter. This may seem a very simple question and one easily disposed of; but such is not the case. The farther we proceed in the work the more difficult do we find its complete solution. The herd at St. Anthony Park happened, fortunately, to be composed of various kinds of dairy cows, belonging to various breeds, and their grades. While at first we thought it was rather unfortunate that we had so many of what you might call beef cows, or general purpose cows among them, it has turned out a very fortunate thing indeed. The herd was composed of Holsteins, Shorthorns, Jerseys, Guernseys, Polled Angus and others of various grades. We kept an exact record of the feed consumed by each cow during each part of the year. While they were out at pasture they were charged a reasonable amount for the pasture, and while in the barn the feed was weighed out to them, and a record made not only of the weight of the feed given, but the proportions and different kinds of feed the ration was composed of. The milk at each milking was also weighed, and a test made of the per cent. of fat for each milking during the year. At the end of the year we found that the herd, as a whole, had averaged 364 pounds of butter. This was a very good record, considering the character of the herd, but examining the record, we found that the results varied greatly, both as to the amount of butter produced by the different cows and as to the cost. Examining more carefully the record of each cow, we found that while one Holstein charged us 17 cents, another Holstein charged us only 12 cents; that while one Shorthorn charged us 12 cents, another Shorthorn charged us 18 cents worth of food for every pound of butter produced. We found the same variation in the different breeds that were represented. Consequently, we came to the conclusion that there was no use in drawing any line as to breeds, for we found good cows and poor cows in all breeds. Examining the cows as to their size, we found large cows that were good and large cows that were poor, small ones that did good work and small ones that did poor work. So to ascertain, if we possibly could, why this variation existed, we placed the cow that charged the most for feed on the one side, and the one charging the next highest with her, and so on, making two groups of all the cows, the good cows on the one side, and the poor cows on the other. Taking these two groups and comparing one with the other, we noticed this peculiarity, that the unprofitable cows were all more or less inclined to put on flesh, while the profitable cows were all spare with deep bodies. Seeing this variation we thought we would carry on the experiment a little further during the winter time, as this record comprised the whole year when the cows were part of the time out in pasture. We commenced with the fall's work, carefully analyzing all the feed used, weighing it out to each cow, and weighing the milk and testing each cow's milk as we did during the year, and at spring time we footed up the record. We found that the group of cows that had, during the year, charged us the least for butter had made butter during the winter at an average cost of 12 cents a pound, while the cows on the other side ranged from 16 to 18 cents a pound for butter. We also found that there were cows in the first group that did better than others, and so we re-sorted those cows, again placing the cow at the head that laid on the most flesh and examining the record, we found she had charged us the most for butter. Placing the next fleshy cow to her, and examining the record, we found she charged a little less, and so on down as they decreased in the amount of flesh they carried. Now, that gives a pretty good idea why this variation existed. We have now carried on this experiment four additional years, and I wish to present to you this evening the result of two years' work, 1895 and 1896, and the winters' work of 1895-6 and 1896-7. We have decided to divide the cows into two groups. I will give you here a representative of each group of cows, those inclined to lay on flesh, and the spare and deep-bodied cows. Taking the record for the year 1895, we find that the cows produced on an average 7,400 pounds of milk. Now, we would naturally suppose that a herd of cows that averaged as large a quantity of milk per year as this would be good enough for anybody. The average annual yield was 352 pounds; the average cost of producing a pound of butter for the year was 8 cents. I refer to the cost of feed at the local market prices. The cows ranged from 241 pounds to 554 pounds. The cost ranged from 7 to 10 cents.

Fig. 4 is of the cow that charged the least, Houston, and Fig. 3, Ethel, the one that charged the most for butter. Examining the other members of the herd, we find again that those that charged us a relatively large amount for a pound of butter are the cows carrying more flesh than those that produce it relatively cheap, and we find that the line is drawn very close. The least tendency on the part of a cow to lay on flesh increases the cost of production in the same proportion. The average cost for feed for the year was $28. The average per cent. of fat ranged from 2.05 to 5.02. Let us take the record for 1895 and divide the cows again into two groups, as we did for the year 1893, placing at the head the cow that charges us the most per pound for butter, which is Ethel, yielding us 241 pounds at 10.44 cents per pound. Taking the next cow, that charged us the next highest price for a pound of butter, we have a dairy bred cow, being thoroughbred registered Swiss. Let me read this cow's record. Cost of feed for the year, $32; the average cost for that group of cows was $28; yield of milk, 7131.2 pounds; cost of 100 pounds of milk, 46 cents. Average pounds of butter yielded by the group, 303 for

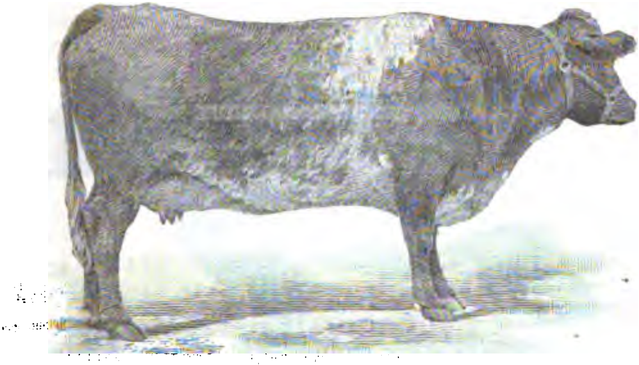


Fig. 3. Ethel.

the year; cost of a pound of butter, 9.3 cents. Now, on examining the record of the other cows in the group, one had charged us 8.6 cents, and another charged us 7.8 cents, and we find that they carry about the same proportion of flesh as did the other two cows I have mentioned. Notwithstanding the fact that these cows charged us a pretty large price for butter, they returned us for every dollar's worth of feed they received during the year $1.61 worth of dairy products, and for every dollar's worth of feed they gave us 10¾ pounds of butter.

Now, let us examine the group of spare cows as illustrated by Houston (Fig. 4). They charged us on an average $30 per year for feed. They gave us on an average 8,283 pounds of milk, as against 6,817 for the other group. You will notice that these small cows gave a better yield than did the large cows. The cost of 100 pounds of milk was 37 cents, against 41 cents by the other group. The average annual yield of butter for the year was 446 pounds. The average cost of producing a pound of butter was 6.9 cents. After examining each animal in this group separately we found, with one exception, that the animal that carried the least flesh, charged the least for dairy products. For every dollar's worth of feed consumed by this group they returned $2.17 worth of butter, and for every dollar's worth of feed they received they returned 14.47 pounds of butter. Now, notwithstanding the fact that the cows in the first group averaged over 300 pounds of butter per year, they charged us 38 per cent. more per pound of butter than did the spare cows having deep bodies. There is only one class of business men that can carry on business on such a losing basis at all, and this is the farmer. The average business man would not stand it for a minute. He would begin to figure and find out how he could produce dairy products for the least money, and make the most money out

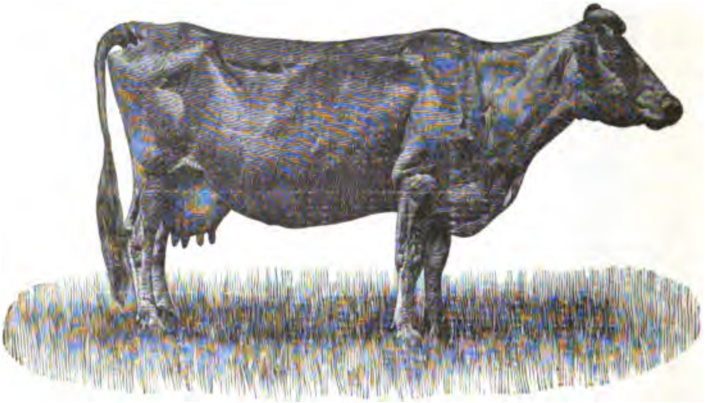


Fig. 4. Houston.

of every pound of butter made. But, unfortunately, it is not so with the farmer. He has his mind made up that he wants a sort of double-purpose cow, one that will give a little milk, and at the end of her life-time will give him a little poor meat, and in that way he loses every year from every cow more than would buy him a good young steer. Let us take, for instance, one of the best general purpose cows in this lot. She gave us over 9,000 pounds of milk. She gave us 387 pounds of butter, and charged us for feed $30. The 387 pounds of butter at 15 cents a pound would amount to $58. Deduct from the $58 the cost of feed, $30.32, and we have a net return from this cow of $27.74. Now, let us take one of the spare cows with deep body, in the other group. She gave us 489 pounds of butter, which at 15 cents a pound would amount to $73.49, giving no credit whatever for skim milk. Taking from this $31.38, the cost of feed, and we have the net returns from this cow, $42.11, against $27.74 for the best cow in the other group, being a net return from the dairy cow over the best dual-purpose cow of 52 per cent. Let us compare that cow with Houston, a cow that does not have the largest record in that group, neither did she that year make butter the cheapest, but I will make the comparison. As I said before, Lou gave us a net return of $27.74. Now, Houston gave us 404 pounds of butter, which at 15 cents a pound would amount to $60.66; taking $28.49, the cost of feed, from that, and we have a net return of $32.18, being a net return of 16 per cent. over the other cow. Now, let us examine the poorest cow in this other record, with a 3-year old dairy cow of the spare type. Ethel gave us 241 pounds of butter. I am simply giving you the round numbers. This at 15 cents a pound amounted to $36.23; deducting $25.21, the cost of feed, and we have a net return for the year's work of $11.02. Taking the little Guernsey, Tricksey, 3-year-old, she gave us 335.41 pounds of butter, which, at 15 cents a pound, would be $50.31; taking $24.09, the cost of feed, from that, and we have a net return of $26.22, being a net return from the specific dairy heifer over the dual-purpose cow, Ethel, of 137 per cent. Now, let us figure with the whole group of which Ethel stands at the head. They gave us 1,312 pounds of butter, which, at 15 cents a pound, amounts to $196; deducting the cost of feed, $112.86, and we have a net return from the group of $83.94, or $20.99 from each cow.

Now, let us take the other group. They gave us, during the same time, 1,783 pounds of butter, which, at 15 cents a pound, would be $267.58; deducting $123, the cost of feed, we have $144 left, or a net return of $36, as against $20 of the other group, being a net return of 72 per cent. over the cows having a flesh-forming tendency.

I will now ask your attention for a short time to the winter's record of 1895-6. It has been claimed that possibly I was showing a little partiality as between the two types of cows. So we secured some grade Shorthorn cows of a fair dairy type, such cows as our farmers or Shorthorn breeders would recommend as being of the milking family, and they did pretty fair work, taking the group as a whole. Some of them gave us as high as 300 pounds of butter in a year. But the following figures simply have reference to the winter's work. This group of cows is headed by a young Jersey named Beckley. I also find that this Jersey charged me more for butter than any other cow in the lot. She charged 13.34 cents for every pound of butter she made that winter. The Shorthorn cows charged me 7.2 cents and 7.7 cents. We will take out this little Jersey, Beckley, for the reason that the conditions that surrounded her were not common to the other members of the herd. She had acquired the habit of laying on flesh, and she also was unfortunate that fall, and on that account charged us more than she would under normal conditions.

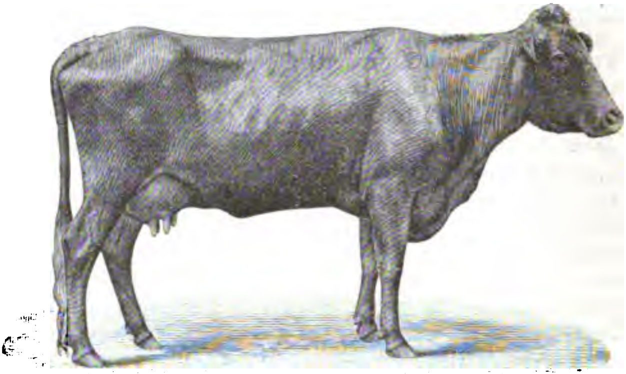


Fig. 5. Olive.

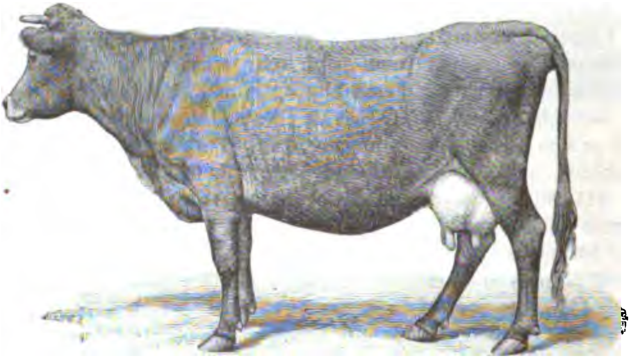


Fig. 6. Fortune.

We will also take up another cow by the name of Olive. (Fig. 5.) You will see at a glance she does not represent either group. This cow is a grade Guernsey. She worked with us at the Experiment Station a little over six years. During all that time she was fed every day all she wanted, and yet never laid on any flesh. Still she did not produce dairy products cheaply. But when we came to examine her record we found that during all that time she was never able to eat a good square meal, and you will notice that she had a very light digesting capacity. You can always measure the capacity of a cow to digest a large quantity of food by the comparative size of the middle of the body. A cow of Olive's type is always a very light feeder, while a cow of the type of Fortune is a heavy feeder, and you can see at a glance which cow will produce the greater quantity of butter. So we will take those two cows and two or three 2-year-old heifers out of the list. We can not make comparisons with heifers, for the reason that they use some of the food for growth, consequently we can not place them in these experiments. This time we have quite a large group of the general purpose cows.

Table showing cows in the herd during the year 1896, their breeding, cost of feed, pounds of milk, cost of 100 pounds of milk, pounds of butter and cost of a pound of butter.

COW.	Breed.	Cost of Feed.	Lbs. of Milk.	Cost of 100 lbs. Milk.	Lbs. of Butter.	Cost of 1 lb. of Butter.
				Cts.		Cts.
Countess	Holstein	$27 56	11,412.5	24	342.3	8.0
Duchess	Jersey	19 71	6,901 9	28	402 2	4.9
Ethel	S. H	21 38	4,099 8	52	197 0	10 8
Fairy	S. H	20 39	5,844.1	34	271.5	7.5
Fortune	Jersey	21 03	9,111 5	23	493 0	4.2
Houston	J. G	21 38	8,797.3	24	512.8	4.1
Ida	S. H	22 40	6,714 4	33	300 5	7.4
Liggetta	S. H	23 31	6.556 0	35	263 0	8.8
Lydia	Swiss	23 07	8,030 3	28	322.1	7.1
Olive	G. Guernsey	18 72	7,005 1	26	331.6	5.6
Quidee	Holstein	21 61	6,652.8	32	279.6	7.7
Shortie	Gr. S. H	14 43	5,139 9	28	282 1	5.1
Sweet B	Guernsey	21 90	6,364 6	34	371 5	5.9
Topsy	G. Holstein	32 72	11,726 2	27	520.5	6 3
Average		$22 12	7,454.	29	349 3	6 3

It will be seen from the foregoing table that the cost for feed ranged from $14.43 to $32.72, and averaged $22.12. The average annual yield of milk was 7,454 pounds; the yield of butter ranged from 263 pounds to 520 pounds, with an average for the whole herd of 349.3 pounds. The average cost for feed to produce 100 pounds of milk was 29 cents, and of a pound of butter 6.3 cents. Houston, the cow that produced a pound of butter for the least cost, carried the least flesh, and Ethel, that charged the most, carried the most flesh. Ethel and Liggetta carried the finest udders in the herd, running well up behind and out in front. The udder alignment of Houston and Sweet B. is the shortest, while that of Fortune, Olive and Topsy is just medium.

Table showing group of grade Shorthorn cows, average weight, cost of producing a hundred pounds of milk and a pound of butter, and dry matter consumed to one pound of butter.

COW.	Breed.	Weight.	Cost of 100 lbs. Milk.	Cost of 1 lb. Butter.	Lbs. of Dry Matter to lb. Butter.
			Cts.	Cts.	
Belle	G.Shorthorn	995	33	7.4	22.51
Berry	"	940	40	7.6	23.65
Ethel	"	1,170	35	7.1	21.55
Fairy	"	860	33	7.2	22.20
Ida	"	1,150	36	8.4	25.93
Maud	"	1,100	29	7.0	21.21
Shortie	"	640	40	7.7	23.81
Sophia	"	940	41	7.4	22.91
Lou	Holstein	1,235	29	6.9	20.97
Lydia	Swiss	1,180	26	7.0	21.32
Average			33.8	7.4	22.61

The range in cost of a pound of butter from this group is from 6.9 cents by the high grade Holstein to 8.4 cents, and the average cost for the group is 7.4 cents. In every instance the cost depends upon two conditions—the amount of flesh they carry and the feeding capacity. Of the group, Lou had the deepest body, while Ida had the least depth.

Table showing group of dairy type cows, average weight, breed, cost of producing a hundred pounds of milk, a pound of butter and pounds of dry matter consumed to one pound of butter.

COW.	Breed.	Average Weight.	Cost of 100 lbs. Milk.	Cost of 1 lb. Butter.	Dry Matter to 1 lb. Butter.
			Cts.	Cts.	
Duchess	Jersey	796	34	6.1	18.67
Fortune	Jersey	940	24	4.6	13.81
Houston	Jer. Guern.	930	24	4.2	12.65
Sweet B	Guernsey	1,065	32	5.8	17.62
Topsy	Gr.Holstein	1,200	26	6.0	18.51
Tricksey	Guernsey	838	35	5.8	17.78
Average			24.9	5.4	16.59

Now we will examine the group of spare, deep-bodied cows. Of the cows in this group, Houston carried the least flesh, while Duchess carried the most. Both Topsy and Sweet B. have only a slight tendency to flesh forming. The spare, deep-bodied group charged for a hundred pounds of milk 24.9 cents, against 33.8 cents by the first group, while the spare cows charged 5.4 cents for a pound of butter, as against 7.4 cents by the other group, being an excess of 37 per cent. of that charged by the spare cows.

This work, as you will see, has been carried on for several years. The cows have been fed with the greatest care, each cow fed just as much as she could dispose of, giving them one-third grain and two-thirds roughage and succulent food, or in round numbers, ten pounds of grain, ten pounds of roots and ten pounds of hay, or if you want to feed fodder corn, the cow that gets ten pounds of grain gets fifteen pounds of fodder corn and ten pounds of roots. That is the general principle on which feeding is conducted at St. Anthony Park. The reason we feed so much grain is that we can get the nutrients cheaper through the grain than through roughage, consequently we feed the cows as much as we dare to of the grain. Let us take, for example, the records of these two cows, Houston and Ethel, and examine their work for the winter, in detail. The cows came in about the same time; Houston, I think, about the last week in November and Ethel the first week in December; so they were practically fresh at the same time.

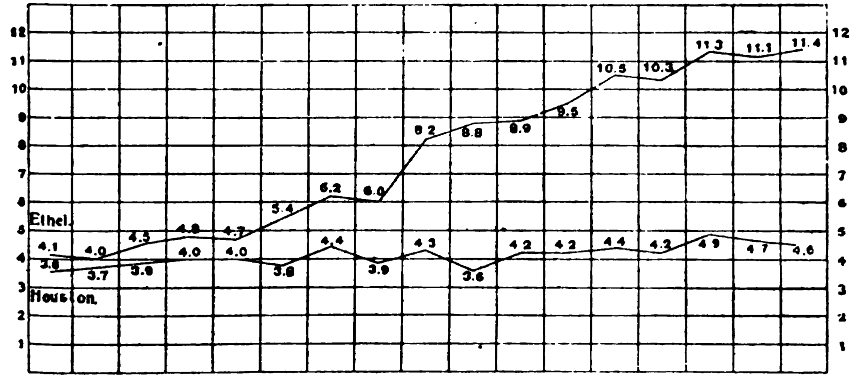


Fig. 7.

The chart in Fig. 7 gives a striking illustration of the difference in cost of producing butter from the cows Houston and Ethel. The horizontal spaces represent cents in cost of a pound of butter. The perpendicular spaces represent weeks.

Commencing the week after Ethel came in, we find that they both charged about 4 cents a pound for butter. The third week Ethel charged 4½ cents per pound for butter and Houston 3.9 cents. The fourth week Ethel 4.8 cents; Houston, 4.8; and so they go along during the winter, Ethel increasing the cost of her production until the week ending on the third day of May, when she charged me 11.4 cents, while Houston was only charging me at that time 4.6 cents. Now, as to the yield of butter, when these cows were fresh, they differed very slightly. Houston, during all the time she was at the Experiment Station, never saw a time she could make fourteen pounds of butter per week. Ethel made over thirteen, so you see they were very closely matched when they started in, but at the end of the winter Houston was still giving twelve pounds, while Ethel was only giving four pounds. During this time Ethel gradually gained in weight, while Houston remained not quite normal in her weight; she milked down some.

We will now divide the cows into three groups instead of two. I do this because I want to take out of the general-purpose group Ethel and classify her as a beef cow; so I will put her by herself. Her average weight was 1,203 pounds, cost of feed $21.38; quite a light feeder, the lightest feeder for her size in the lot. Pounds of milk for the year, 4,099; cost of 100 pounds of milk, 52 cents; cost of a pound of butter for the year, 10.8 cents. Now let us make a classification of the cows that give a fair quantity of milk and that have a slight inclination to lay on flesh. In this group the poorest cow gave 262 pounds of butter; the best 322. The group as a whole averaged 289 pounds. The average cost for feed was $22.29; the yield of milk was on an average 6,786; the cost of a pound of butter was 7.7 cents. The four cows yielded 1,157 pounds of butter, which, at 15 cents a pound, amounted to $173.59. Deducting $99.17, the cost of feed, leaves a net return from the group of $84.42, or an average of $21.10 per cow, or an average net return from the general purpose type over the beef type of 157 per cent. Now let us take the group of dairy type cows. The average cost of feed was $23.35, as against $22.29 for the general purpose cows. The average yield of milk for the year was 8,580, against 6,700 by the general purpose cow. Here we find again that the little, spare cow exceeds the large cow even in the flow of milk by a very large per cent. The average cost of 100 pounds of milk was 27 cents against 32 cents with the other group and 52 cents for Ethel. The average yield of butter for the year was 460 pounds as against 289 for the general purpose group, and 197 for the beef cow. The average cost for producing a pound of butter for the year 1896 was 5 cents, as against 7.7 cents for the general purpose group, and 10.8 cents for the beef cow. The five cows yielded 2,300 pounds of butter, which, at 15 cents a pound, amounted to $345.01. Deducting from this $116.74, the cost of feed, leaves a net return of $228, or an average net return per cow of $45.65, against $8.19 for Ethel and $21.10 for the general purpose group, or an average net return from the group of dairy cows over the general purpose group of 116 per cent., and over the beef type of 457 per cent. The figures are simply appalling. When I consider the style of cow that the average farmer is using I am surprised that he makes any money in dairying, especially when we consider how his cows are being fed and treated. Let us take two of these cows and make some comparisons. We will take this cow, Lydia (Fig. 8), and Houston (Fig. 4).

Houston averages about 400 pounds of butter per year, and Lydia about 300 pounds. Both of them are dairy bred probably for a hundred years or more. The cost of feed for these two cows was, for Houston, $21.38; the cost of feed for Lydia was $23.07. The yield of milk was, from Houston, 8,797, and from Lydia 8,030, very closely matched. If a farmer simply looked into the pail and did not use his pencil he would say one is about as good as the other, but if Lydia had given us the same amount of milk in proportion to her feed, she would have given 9,492 pounds of milk as against 8,030. As to yield of butter, Houston yielded 512.84; Lydia, 322 pounds. But had they given us butter in proportion to the feed they consumed, Houston would have given us 512.84, and Lydia 553.37 pounds. Taking the net return and rating the butter from each cow at 15 cents per pound and 15 cents per hundred weight for milk, we would receive from Houston $67.64, and from Lydia $36.29. But had Lydia returned us in the same proportion for feed consumed as did Houston, we would have received $72.98, being a loss of $36.69, over 100 per cent., for the general purpose idea, or for the hope that some time in the future we could realize a little something from the carcass of that cow. I could make other comparisons that would be equally interesting and instructive, but I think I have given enough.

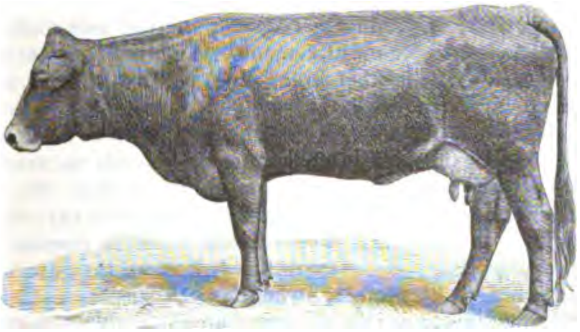


Fig. 8. Lydia.

Now, I would like to touch just a few moments on why this is so. As you have heard, Lydia ate more feed than Houston did. We find that the amount of feed a cow consumes is not always the measure of the dairy products returned. There is a factor involved in this that we do not pay sufficient attention to. We have been carrying on experiments in food of support during the last three winters. This winter we have three cows confined in stalls that are simply getting enough feed to maintain them, neither permitting them to lose flesh nor to gain flesh, and we find the weight of the cow is quite an item as to the amount of food she takes for her own individual use. The rule is that an animal weighing 1,000 pounds live weight requires 17.5 pounds of dry matter for food or support. Now, when you consider that an animal can only eat about 25 or 24 pounds of dry matter per day, we see what a large percentgae of that food she uses for herself, if that figure is correct. Our record so far indicates very strongly that it takes only about a pound of dry matter per day to support 100 pounds of cow. The last winter it took .933 pounds, but as there was a slight decrease in weight, we have come to the conclusion that we have got it a little below the true figure, but we are going to continue the work until we are absolutely sure of the amount of food required to maintain a given amount of weight. If we have that factor once secured, then we can make calculations as to how much food is required to produce a pound of butter, and until we have that we cannot find out. You will remember I stated that Olive did not produce butter cheaply, notwithstanding the fact that she did not lay on any flesh. There are two cows that weigh nearly alike. One of them averaged last winter 26 pounds more than the other. So we may assume that they weigh about the same. Examining the records we also find that Fortune will eat per day 25 to 26 pounds of dry matter. We find that Olive can only take about 19½ to 20 pounds. We will say, in order to get our example in a plain way, that Fortune takes 25 pounds, and that Olive can take 20 pounds. Now, there are two cows that are not in the habit of laying on flesh very much. They lay the surplus nutriment they have, over and above their needs, into dairy products. They both weighed 900 pounds. Olive would take the 9 pounds of dry matter she needs for herself from the 20 pounds that she can eat and she has only 11 pounds to convert into dairy products, while Fortune has 16 pounds or nearly 50 per cent. more. So it follows that the proportion of food that one of them returns in dairy products would be only a little over one-half, while the other would return about two-thirds of the food she takes in dairy products. That is the reason why the one cow charges us more for the butter she makes than the other.

The question is frequently asked, which requires the most feed, a pound of butter or a pound of gain, or a pound of flesh you might say. Last winter I carried on an experiment trying to get at some data on this point. I had four ordinary steers that were fed just as the cows were. They were tame, they were gentle and contented, and were in shape to do good work. I was going to feed the steers a dairy ration just the same as I fed the dairy cows, and there were some objections made to that, and there was a beef ration prescribed for the steers; so I had to feed the cows a beef ration also. This work was carried on during the whole winter, and without going into detail in regard to the work I will give you the rations as they were fed. During the first period, covering five weeks, the cows and steers were fed on a ration composed of a mixture of five pounds of bran, six of corn, and one of oil meal. One steer produced gain at a cost of 2.9 cents; another charged me 3.5 cents; another charged me 2.2 cents; while the other one charged me 3.9 cents. You will see here a variation in the charge for gain just the same as we find among the dairy cows. The average cost during the period was three cents for a pound of gain, during the first period, and the average gain during that period of all the steers was 1.8. We then changed the steers and cows over to this ration: Eight pounds of bran, two of corn, and two of barley, giving each steer and each cow all they could take. The first steer charged me 1.25 cents per pound gain; the next 1.56 per pound gain; the next 1.4; the next 1.48. The four steers charged me on an average 1.4 cents for a pound of gain, and again the average gain per day for the four steers during the period of five weeks was 3.1 pounds against 1.8 pounds under the first period. The average cost during the whole period was two cents per pound gain. The average amount of dry matter required to produce a pound of gain was 8.35. Taking the dairy cows, we found that the average cost for a pound of butter was 3.9 cents for both periods; the first period being 3.93; the second 3.91. The dry matter required during the first period was 15.25; during the second period 16.98. You will see that the amount of dry matter required, and which will really be the basis of our calculation, for the two grades of cows, was 15.17 to produce a pound of butter; with the steers it was 8.35; but after we had slaughtered the steers and dressed them we found this result: To produce a pound of finished butter it required 15.17 pounds of dry matter, and a pound of dressed meat required 15.41 pounds of dry matter, being practically the same. The cost was, for butter, 3.7 cents; the cost per gain pound of the steer was two cents. The cost of a pound of dressed meat was 3.7 cents, just as it was for a pound of butter. So we have it practically that it requires the same amount of dry matter or food to produce a pound of butter that it does to produce a pound of dressed meat.

At the conclusion of this address, President Stubbs introduced Prof. C. D. Smith, of the Michigan Agricultural College, who lectured on

THE DEVELOPMENT OF THE DAIRY COW.

BY PROF. C. D. SMITH,
Director Michigan Agricultural Experiment Station.

While the Jersey breeder may dote on the gazelle eyes, the finely chiseled face, the clean cut throat, the shapely udder, emaciated form and aristocratic carriage of the best product of the island of tree fuchsias, small farms and big prices, while the breeders of the black and whites may hold in sweet remembrance the grand forms, the immense udders, the tremendous yields and unpronounceable names of the descendants of the fogs and fens of flat Dutchland, I speak for the dairy cow of all breeds, and wonder at the magnitude of the work she does, and the almost incredible feats of transmution she performs. We often laud these, our foster-mothers, as extraordinary milk givers, without for a moment appreciating the significance of the facts we recount or what is involved in the process of elaboration of a single mess of milk.

At a recent meeting of breeders of improved live stock in a neighboring State, I listened to the account of the remarkable performance of a thoroughbred shorthorn steer that put on three pounds of gain a day for thirteen consecutive weeks. This means that the steer ate, digested and assimilated sufficient food to store up in his body twenty-one pounds of flesh and fat in seven days. Judging from the results of the Rothamsted experiments, fully five pounds of this gain must have been water, leaving sixteen pounds as the measure of the increment of dry matter to his weight in the week.

A certain dairy cow at the Michigan Agricultural College gave in five weeks, beginning April 29, 1896, 2,842 pounds of milk, containing of fat 97.14 pounds and of solids not fat 247.86 pounds, or of the total dry matter 345 pounds, equal to 69 pounds per week. The steer referred to was doing something phenomenal when he laid up on his selfish body sixteen pounds of dry matter per week, but here was a cow that laid up in her milk, secreted unselfishly for her offspring, more than four times as much. Granted that this particular cow was herself a phenomenon, let us take the record of a little one thousand pound Jersey standing by her side. This cow gave for the same five weeks 1,273.7 pounds of milk, containing 60.68 pounds of fat and 117 pounds of other solids, or a total of 177.68 pounds of dry matter. This was a deposition of over five pounds of dry matter in the milk per day as against half that amount on the part of the remarkable steer.

Who can explain that mysterious power that accompanies maternity, whereby the bovine mother is enabled to digest and in the unsearchable caverns of her own body transmute so great an amount of feed into nutrients for her offspring, amounts large enough to occupy the digestive organs of her male brother for four times as long as she needs to fit thēm for the wants of her progeny? The modern highly developed dairy cow is a marvel of digestive ability, an evidence of man's ability to mold domestic animals into machines that best subserve his purposes. For in this relation the cow is simply a wonderful machine, bred and built up by man to rapidly and economically convert his feed into butter and cheese. She differs as widely from her untrained ancestress as does the modern locomotive from the Indian ox cart. Like the locomotive, she is the product of the inventive genius of mankind for many successive generations. The locomotive did not reach its present stage of perfection in a day or in one generation. It required careful improvement year after year. So the dairy cow has yielded to the careful selection and good feeding of successive generations of cow lovers, until to-day she stands as one of the great marvels of the breeder's art.

It is pleasant to remember that the high class dairy cow is not the product of any one breed, and that no single breed has a monopoly of dairy qualities; all breeds number in their lists some poor cows, and there is scarcely one that does not present some good milkers. The early shorthorns were distinguished by their milking qualities, as well as by the rapidity with which they laid on fat and the remarkable symmetry of their forms. We can "point with pride" to the performances of the Jersey and of the Holstein. The Brown Swiss has made her name famous by world renowned records in the show yards of the old country and the Red Polled cow has demonstrated her right to be called a dairy animal in the fairs in the neighboring State of Ohio. Even the much despised native should be remembered, though there is no one to sound her praises or for the sake of selling her progeny report her best yields.

In this country, one of the earliest famous records was made by the Oakes cow, whose characteristics I will show you later on the screen. This celebrated animal was a native of Massachusetts, and winner of the first premium at the State fair of that State in 1816. She yielded in that year 467.25 pounds of butter from May 15 to December 20. Her milk was of remarkably high quality, since she gave but 44.5 pounds of milk per day in the flush of the season. This cow was called a native. That means that she was a creature whose pedigree was uncertain. It is more than probable that, could we but trace her ancestry, we should find without going far back some animal whose ancestors for generations had been selected and bred along the lines of butter production. There lurks in the memory of every veteran dairyman before me the picture of some so-called native cow with immense udder, of wedge shape and true dairy type, whose yields of milk and butter made her known all over the section where she was bred. A good cow is a good cow, no matter to what breed she belongs, and a poor cow is a poor cow in spite of her printed pedigree.

I would not disparage for a moment the value of pedigree in the development of our milk givers. The modern dairy cow is the resultant of two cogent forces, inheritance and judicious feeding. Go into any country noted for the quality of its dairy stock and you will find that the breeders appreciate the full value of both of these forces. You will find that for their breeding stock they save the calves of their best cows, which are of course in turn the calves of other best cows, which are again the descendants of the best sons and best daughters of generations. They couple with this good breeding, good feeding, and try to make each best progeny better than its best ancestor. To the farmer, who wishes to raise a uniform and efficient dairy herd, no question is of more importance than the selection of the foundation stock from animals that are descended from a succession of dams that are good milkers, and from a succession of sires that are the progeny of generations of good milkers. No matter what the breed may be the method of selection is the same. The milking habit is a matter of heredity, and too much attention cannot be paid to the necessity of breeding from those animals alone that trace their descent through a long line of heavy milking cows.

Granted that we have good stock to begin with, it must be remembered that their excellence can be maintained alone by developing to their utmost the young stock, by making each lot of calves into better cows than their ancestors, immediate or remote. This is a matter of judicious feeding, and it is the main purpose of this paper to discuss that side of the question. It is very evident at the outset that the development of the dairyman must keep pace with the perfecting of the dairy cow. The dullard may drive an ox cart, but he cannot run a locomotive. The more complex the mechanism, the greater the liability to get out of order and the greater the skill required to operate it. The more refined and more highly developed the dairy cow, the greater the tendency to deterioration and the greater the skill required in the feeding and care. Let no thoughtless tyro dream that he can handle with success the refined and delicate dairy cow. She must be in good hands from the day of her birth to the day of her death, to come into the possession of all her possibilities. How will a wise dairyman feed and care for his calves, heifers and cows to produce the highest results?

All are agreed that dairy calves should be fed for growth, but there seems to be a widespread fear lest if the calves be fully fed they will grow into beef animals rather than true dairy cows. Before reciting the methods and results at the college of the faculty of which I have the honor to be a member, I want to go over with you some of the methods employed by successful breeders of dairy cows in Michigan and elsewhere, noting some of the results obtained.

W. S. Carpenter, of Menominee, Mich., is a breeder of Holsteins, who is reaching results far above the average, and approaching the phenomenal. His method of handling the young stock is so unique that I mention it first of all. The two peculiar and characteristic features of his method are breeding the heifers early and feeding high before the birth of the first calf. The first heifer with which he experimented was Goldie Clothilde, 33,000, H. F. H. B. Three months before she was due to calve, he fed her the same as he would a cow in the full flow of milk, giving a full grain ration of bran and old process oil meal, eight pounds of the former and two of the latter, starting with a small grain ration and coming up gradually to as much as she would eat. The udder was rubbed once or twice a day for fifteen or twenty minutes, for a month, or even longer, before the birth of the calf and for a week to ten days thereafter. He aims to have his heifers calve at two years old, his idea being that you can tell the first year of her milking whether a heifer is a profitable one to keep or not.

The following records are submitted as evidence of the value of Mr. Carpenter's method:

NAME.	No. H.F.H.B.	Date.	Age.	Length of Period.	Milk.	Fat.
Goldie Clothilde	33,000	Dec. '94	2 years	9 months	7,766	
		Nov. '95	3 years	12 months	9,844	
		Nov. '96	4 years	9 months	8,225	
Goldie Clothilide 2d	39,392	Nov. '96	2 years	10 months	7,598	Incomplete
Goldie's Last	36,817	Jan. '96	2 years	14 months	10,567	
		Apr. '97	3 years	7 months	9,167	Incomplete
Paula Jewel	36,821	Oct. '95	2 years	13 months	10,645	
		Nov. '96	3 years	11 months	7,568	
Vevie Night 3d	36,819	Jan. '96	2 years	11 months	10,595	
Rixa Silva 3d Bettina	39,390	Mar. '97	2 years	7 days	290	Fat, 9.60
Rixa Silva Last	39,389	Mar. '97	2 years	7 days	293	9.30
Bomaz 2d Bettina	39,500	Mar. '97	2 years	7 days	275	12.34

It is too early yet to form a decided opinion as to the adaptability of this method of crowding incoming heifers, to your conditions or mine. We must wait until Mr. Carpenter's cows are fully matured, watching for evidence as to their staying qualities and endurance. The evidence to date is submitted for your consideration.

RECORD OF THRRE OF THE ROSENDALE HOLSTEINS.

NAME.	Age, Years.	Milk in One Day.	Butter in One Week.	Total Milk for Year.	Total Fat for Year.
				Lbs.	Lbs.
Johanna Rue	2	44.9	15.4		
	4	70.0	18.2	14.000	
	6	82.6	22.1	17.867	610.73
Johanna 5th's—Clothilde	2	46.6	12.25		
	3	60.3	16.00	11.655	
	4	....	....	14.233	498.14
	5	....	20.08		
Johanna Rue 2d	2	50.6	12.2		
	3	61.0	14.0	12.230	
	4	67.0	18.5	15.739	522.61
	5	72.0	21.26		

Gillette & Son, of Rosendale, Wis., has a large herd of Holstein cattle, which is rapidly improving in quality, excellent as it was at the outset. A statement of some of the successive records of some of their cows, followed by the statement of their method of handling the young stock, is of interest.

These cows show remarkable progression from a remarkable beginning, and we cannot fail to desire to know how the Gillettes handle their calves. They plan to keep their calves in good flesh "and to push them for all they are worth with bone and muscle-making foods, not only when calves, but all through their early life." "Cows I aim to feed all they will eat every day in the year, and at no age or stage do I want the 'skinny' sort, though some cows will work off surplus flesh into the milk pail in spite of heavy feeding and favorable environments. Under this management I am getting some very flattering results, and think some of my young cows at maturity will follow closely at the heels of Belle Sarcastic." The calf is allowed to remain with the dam only about six hours, for the reason that the early removal excites less anxiety of the mother, and the calf takes to drinking more readily. Each calf has a separate, roomy box stall. Whole milk is fed liberally for the first six weeks, after which the calf is gradually weaned from it and put on skim milk warm from the separator, to which is added old process oil meal scalded to a jelly. An appetite for grain soon develops, which is supplied at once, at first with a very small quantity and later larger amounts of ground oats and wheat bran mixed in equal parts by measure. The calves also have access to good early cut clover hay and later a small amount of corn silage as soon as they will eat it. "Bone and muscle and early maturity are what I seek to develop in the dairy calf, and with the foods mentioned I push them, realizing that there is no time in an animal's life when the food cost of one hundred pounds live weight can be produced so economically as when they are young."

"But growth is not all to be considered, but another point of no less importance is health and vigor, which is promoted by good sanitary treatment, freedom from exposure, cleanliness of pens, plenty of fresh air, abundant sunlight, abundant exercise, and occasional grooming and kind treatment. I advocate good condition (not beefy) and the feeding of bone and muscle forming foods in such quantities that her development may not be checked, so when she takes her place in the string of milkers she will shape herself and respond with more certainty and more accurately to the dairy functions and her true characteristic nature."

W. B. Smith & Son, of Columbus, Ohio, are breeders and feeders of known merit. I shall later throw upon the screen pictures of some of their cows, as types of the matured veterans of the dairy. Their method of developing calves does not differ essentially from that already given, except perhaps that they feed more grain and lay greater stress upon abundant or superabundant exercise. They do not object seriously to fat on the dairy heifer. The latter when fresh will milk it away. Fat is kept down when the animals are calves, by the plentiful exercise.

George C. Hill & Co., of Rosendale, Wis., have, as you know, a first-class herd of Guernseys. Their method of handling the young stock differs little from that already referred to. One of the firm wrote me recently on the point, saying: "We keep the calves and young stock growing as rapidly as possible, but don't want them to get fat. Two or three months before a heifer is due with her first calf, we increase the grain ration to all she will eat, and if she gets a little fleshy at this time, which is unlikely, it does her no harm. We like to have a heifer make up as big an udder as possible at first calving. Note how like are the methods of Hill and Carpenter."

Superintendent Chas. H. Royce, of the Ellerslie Stock Farm, indicates briefly something of their plan of calf raising in a recent letter as follows: "It has been the experience here that in order to make a good record a cow must carry a fair amount of flesh; indeed. some say that our cows are fat. Our calves are raised on Blatchford's calf meal and other foods, with little milk, and are rather thin than fleshy, though by no means so lean as most breeders desire."

The Hood farm at Lowell, Mass., is made famous by the records of its Jersey cows. It is their plan to feed the heifer calves principally on skim milk and clover hay, with enough of a mixture of bran, ground oats and oil meal to grow them rapidly. All calves are given an abundance of pure air and exercise.

C. P. Goodrich and C. H. Everett, both of Wisconsin, agree with the methods just set forth, feeding their calves abundantly on skim milk, clover hay, bran, oats and oil meal. Both avoid anything that will encourage the habits of converting feed into beef, hence avoiding corn meal and timothy hay. Upon these points therefore, there seems to be practical unanimity on the part of calf raisers. All are agreed that it is good policy to feed young calves well and to keep them growing and getting ready for their life work. The constitution of a dairy cow is to undergo a fearful strain in the milk-giving years, and she will need all the preparation possible for that work. There should be no stinting, no semi-starvation, no relegation to the straw stack, no hard usage.

Next, all are agreed that the food given these calves should be relatively rich in protein and bone making material. Heading this list comes skim milk, oats, bran or middlings, clover hay and oil meal.

Such are the feeds used at the Michigan Agricultural College. Each dairy calf, in her separate stall, receives whole milk for a week or two only, or until she gets "straightened up," as the herdsman calls it. The skim milk is substituted gradually, and the grain ration, consisting of one part oil meal, two parts oats and two parts bran, is fed separately. Good clover hay is given a little at first and all they will eat later. The calves and heifers are kept growing, are kept running out doors as much as possible when the weather is decent, though housed from storms and bad weather. They are fed heavily and are exercised violently, to prevent growing fat. In my experience, calves that are destined to make good dairy cows tend to grow fat rather than lean as they approach maturity. With good digestions and good appetites they are bound to lay on flesh if well fed. This has nothing to do with the dairy form which is not modified in the least by this treatment. It is perfectly natural for females of all species to lay on fat just before parturition. I see no reason, then, for worrying about the fact that our heifers, if they are healthy and fed as they should be, tend to become somewhat fat before calving.

As a matter of fact, the cow which, at the Michigan Agricultural College, has made the records most phenomenal, was so very fat, broad-shouldered and beefy as a two-year-old heifer, weighing at that time 1,200 pounds, that I fully determined to discard her as an impossible dairy cow. As soon as she came in milk, she began to lose her fat and develop the finest dairy form I ever saw. So Rosa Bonheur 5th was, as a heifer, well coated with fat, and College Pogis and College Pogis 2d, whose photographs we shall see later on the screen, are entirely too fat, and were so as heifers, to suit the ideas of most of our modern dairymen.

It has been our aim to prepare these young things for the severe tests involved in heavy milking, by developing to the fullest extent the digestive organs. This has been done through heavy feeding and plenty of out-door exercise. Our results do something to show the efficacy of our system. Every heifer but one so treated has responded with an unusual if not almost incredible record.

I can no longer speak in commendation of that style of feeding young stock that strives to develop the dairy form so called, by keeping the young stock lean and skinny on a restricted diet. No one would argue in favor of feeding calves such fattening foods as corn meal; that is not the point. My contention is that to most rapidly and most fully develop the dairy calf such foods as oats and early cut clover hay should be given in abundance, in order to develop the digestive organs, and this even if the calf grows fat and seemingly requires an overabundance of execrise to keep the fat down.

Naturally this method of feeding is comparatively expensive, but it pays. To grow a Brown Swiss heifer from birth to nineteen months has involved the consumption of 5,635.75 pounds of skim milk, 2,511 pounds of silage, 797 pounds of hay, and 1,553 pounds of grain, besides 22 weeks' pasture. Time prevents my giving you other data on this point.

The same general plan of continuous high feeding must be continued after the cows arrive at maturity, if a great record, long continued and economically produced, is the aim. This means not only full rations during the winter, but grain with a pasture during the summer. The term full ration here does not mean excessive high feeding. As is shown by a bulletin recently issued from our station, the average daily food consumption per thousand pound live weight was much less than required by Woll's American Standard. The average ration required to keep our dairy cows up to the limit of their ability, was on the average, per thousand pounds live weight, but 23.57 pounds of dry matter, containing 2.06 pounds of digestible protein, 12.50 pounds of digestible carbohydrates and .89 pounds of digestible fat. The actual average ration being made up of 30 pounds of silage, 13 pounds of mangolds, 3.29 pounds of hay, one pound of corn stalks and 14.12 pounds of a grain ration, made up of one part of oil meal, two parts corn, three parts oats and four parts bran.

Under such conditions of continuous good feeding, some of the results are as follows, and you will note the continuous progression of the cows from year to year. Although it is too early yet to speak with any degree of positiveness on the point, I believe that the developed heifer will, in many, if not most, cases, excel her dam both in total yield and economy of production. Continuous high feeding coupled with persistent dry milking, will produce with all breeds upon which the experiment is tried superior strains of milking cows. Here are some of the results:

Houwtje D., a thoroughbred Holstein, calved March 12, 1888, gave these yields in successive years:

	Milk.	*Fat.*
1892, in 11 months	11,323 pounds.	......
1893, in 10 months	10,780 pounds.	......
1894-5, in 12 months	19,025 pounds.	660.14
1895-6, in 11 months	16,752 pounds.	563.61
1896-7, in 12 months	16,418 pounds.	568.12

Here the cow evidently reached her maximum in the season of 1894-5, as a six-year-old, and maintained her high record to date. Her daughter, College Houwtje, has been making these successive records:

	Milk.	*Fat.*
1894	7,482.3	239.45 pounds.
1896	9,247	287.15 pounds.
1897	11,539	373 pounds.

Belle Sarcastic, calved in January, 1890, has these records to her credit:

	Milk.	*Fat.*	
1893, in 11 months	9,256	......	
1894, in 12 months	21,075	632.78	
1896-7, in 1 year	23,189.6	721.68	
In full period 94-95	30,536	919.	in 21 mo.
In full period 96-97	29,229	928	in 18 mo.

I might weary you further with the successive records of our Jersey cows and Guernseys, showing how they give, year after year, increasing amounts of milk and of fat, until they reach the limit of their possibilities, but these facts will appear as the photographs of the individuals are thrown upon the screen.

I have so far said nothing about the gradual modification of form that takes place as cows yield to the influence of continuous good care and high feeding. The lantern slides will bring out this point more clearly than I can do it in words. This matter of the relation of the dairy form to dairy performance is by no means new. Long ago Baumeister, in Germany, and Youatt and Long, in England, called attention to the importance of noting the dairy form in the selection of cows. Extracts from their works sound like the expressions of our modern dairymen in yesterday's dairy paper.

At the very outset I call your attention to two pictures of the cow Materna, the one taken when we purchased her, and the second one year later. Her record for the first year was 303 pounds of butter, and for the second, 345 pounds. You will note the change in form, consequent upon good care and feeding. Her mate, Milla, also a Grade Shorthorn, gave the first year we owned her 323 pounds of butter, and the second year 378. The changes in her form were equally conspicuous.

We will now throw upon the screen by means of the stereopticon kindly loaned us by the Sir Knights of Lewisville a succession of views, including pictures of some of the most noted cows of modern times. The first slide will show you Belle Sarcastic, as representing my ideal of the highest type of the dairy form. Her records have already been given. Then follow after in order named the pictures of an old Hungarian and an old-fashioned Hereford and Jersey from Baumeister; pictures of Mary Ann of St. Lambert, one of the handsomest and most noted cows which the Jersey breed has produced; the Oakes cow, already referred to; Materna, as purchased and a year later; Pogis Baronne, the mother of the best Jerseys of the Michigan Agricultural College herd; three views of College Pogis II, as a calf, as a mature cow, and showing her udder, her successive records being 4,800 pounds of milk and 265 pounds of fat as a two-year-old, 6,853 pounds of milk and 411 pounds of butter as a three-year-old, and an incomplete record of 6,306 pounds of milk and 386 pounds of butter; College Dame Le Brocq, as a calf and as a mature cow, showing the mature form after the record of 4,130 pounds of milk and 287 pounds of fat as a two-year-old and 6,394 pounds of milk and 448 pounds of butter as a three-year-old; two pictures of Houwtje D., whose records have been already given, the one undeveloped and the other in her mature form; two photographs of Matilda IV, the one undeveloped as a two-year-old and the other fully developed, with a record of 16,154 pounds of milk, and 1,050 pounds of butter in one milking period; Ida of St. Lambert, the mother of the St. Lambert family, a daughter of Stoke Pogis III, dam of Ida's Rioter of St. Lambert, and grand dam of Ida Marigold; Ida Marigold, the prize cow at the World's Fair, with a record of 50 pounds of butter in fourteen days to her credit; three views of Rosa Bonheur, partly developed, fully developed, and a rear view of her immense udder, with records—106.75 pounds of milk in a day and 2,989 in thirty days; College Rosa Bonheur, a daughter of the former, as a two-year-old with a record of 14,172 pounds of milk and 529 pounds of butter; Johanna V's Clothilde, with records already given; Colantha IV, as a three-year-old, with records of 480 pounds of butter as a two-year-old and 577.76 as a three-year-old: Aida II, a Guernsey, a beefy heifer of the Jersey breed; Vasaline, the second prize butter cow at the Ohio State fair, with a record of 18.6

pounds of butter in a week; Hilton Maid II, a prize cow at the same fair, with a record of 19 pounds of butter per week; Iolena Fairmount, with a record of 20.5 pounds of butter per week, and finally Eunice Clay, with a record of 23.9 pounds of butter per week.

These cows are shown to illustrate the typical dairy form and its many variations.

[Note.—As may be gleaned from the above, this lecture was deliveyed by Prof. Smith at night, and a magic lantern was used, and pictures of most of the above named animals were shown to the audience on a screen.—*Secretary*.

Convention adjourned at 10 o'clock, Wednesday evening, December 29, 1897, until Thursday morning, December 30, 1897, at 9:30 o'clock, at which time the convention reconvened, and the following proceedings were had:

SECOND DAY'S PROCEEDINGS.

President Stubbs: You will now have a report from the Committee on Legislation, appointed at the last year's meeting, by Mr. J. J. Billingsley, Chairman of the committee.

Mr. Billingsley: I think the President of this Association said about enough in his paper yesterday to outline this matter. I will say this morning that the appropriation was secured from the Legislature, and it was secured by reason of the influences reasonably brought to bear upon the Legislature. We are very glad that we have received this appropriation, and I hope this Association may be a tower along this line in future Legislatures for the dairy interests of this State. The President of this Association was before the committee, and Prof. Plumb and others appeared before the committee that had this matter in charge in the Legislature, and the dairy interests were represented so well by these gentlemen that this committee granted us the appropriation.

Mr. Commons, of Centerville: I move that a committee of three be appointed to select officers for the ensuing year of the Association. This motion is seconded and was amended on motion of Mr. Benjamin, to the effect that a committee of five be appointed by the Chairman for the purpose of selecting officers for the ensuing year. This motion as amended is carried, and the President announces that he will appoint the committee later.

Prof. Plumb: This Association has never had but one honorary member, and that is His Excellency, the Governor, who has taken considerable interest in the Association, so far as a man in his position can. Now, there is one person that is not a citizen of Indiana, but from the time that this Association first began its work, for years, he has been attending our meetings. He has been here repeatedly in a private capacity, with no official connection with commercial houses, or anything of the kind, and I know, as those know who are in attendance at this meeting, that he is a man that has devoted his life to the dairy interests, and in a way that has represented, as I believe, a good deal of self-sacrifice. He has always very generously given his assistance to this Association in every way possible, and he is also a representative of another dairy association. Therefore, I wish to move that J. H. Monrad, of Winnetka, Illinois be made an honorary member of this Association. Seconded and carried.

Mr. Monrad: I am a poor hand to express my feelings, but I thank you for this honor which you have conferred upon me. I don't know the order or your proceedings, but I want to employ a couple of minutes of your time while your session lasts, and if you want me to, I will take that now.

Mr. President, as you know, I am at this meeting representing the Dairy Division of the United States Department of Agriculture. This division was established two years ago. Experiments have been made to show the English people, notably, that we can make just as good butter as is made anywhere in the world. The trouble has always been that we have had a better home market for our best butter, and it has generally been the poorest quality that has been exported. It is for this reason that American butter had a very bad reputation on the English market, and the efforts of the Dairy Division of the Agricultural Department, especially since Secretary Wilson took hold of it, has been, during the past summer, to send shipments of fine creamery butter there, and demonstrate that if we can afford to do so, we can supply them with as fine butter as anybody.

I am here further to say that the Division desires to work in connection with this Association, and co-operate in every way with it. The Division has gone a little further and taken hold also of the educational work, in so far that when Major Alvord, the Chief of the Division, sent out a lot of circular questions to dairymen and creamery men and asked this question, "What is the most important point that needs improvement in our dairy to-day?" nearly every one of them replied, "It is the care of the milk between the farm and the factory." Hence the Assistant Chief, Mr. Pearson, got up a little bulletin on this subject, "The Care of the Milk," and if any one desires to obtain a copy of that and will send his name to the Dairy Division of the United States Department of Agriculture, with request for Bulletin 63, it will be sent, provided there are any left. There was a very large number printed, but there have been several hundred thousand requests for them.

We can not expect the Government to do more than to just point the way. The real education and the real basis of all the improvements asked by butter-makers and cheese-makers, must necessarily rest with the farmers. A cheese-maker may have a fine factory in which to make his cheese, but what does that matter if you do not deliver him good milk? It is upon the farmer and milk producer that the largest share of the responsibility rests. Too many farmers think that they have nothing to do with the cheese or butter, that they have nothing to do but to get just so much milk, and get the creamery or cheese factory to accept it. That is altogether wrong. The patron of the factory is interested in that milk way beyond New York; he is interested until that cheese is eaten, I don't care where it is eaten. You are interested in it because it comes back in the way of reputation. Suppose you send out a poor quality of cheese, with an off-flavor. You may get your price for it this year, but next year you will not; you will feel it, because the factory can not get the same price for the cheese it makes, and they can not pay as good a price for milk. Every farmer is responsible for delivering good milk. I believe that the farmers are beginning to see this.

You heard the discussion about rye yesterday, and millet and so on. The opinions expressed seemed to be divided, and curiously they were also divided in about the same manner in a discussion I heard at Lincoln, Nebraska, last week, but there we happened to get the solution of it explained in a different way, and that was this: That all those who complained of the bad effect of feeding rye, let the cows run out all day eating this rye, right up to milking time, whereas those that had no ill effect had taken off their cows three or four hours before milking time. One farmer got up and asserted that even leeky flavor might be eliminated if they would only keep the cows off the pasture three or four hours before milking. I confess I would like to get a little further proof of this. Of course, there are different opinions, and it is by discussions in such conventions as these that we can arrive at the truth.

I want to pay this Association a compliment. I have visited in the last 14 years some 120 dairy conventions, and I won't say that you have the best discussions, but I certainly have not been at any convention where I have heard better or livelier discussions, or more interest shown, than was shown here on yesterday. [Applause.]

On motion, it was decided to have the President of the Association appoint a committee to be known as the Legislative Committee, to look after the interests of the Association in the Legislature, and which the President announces he will appoint later in the session.

The Auditing Committee makes the following report, which, upon motion, is accepted:

"Lewisville, Ind., December 29, 1897.

"Your committee, appointed to audit the accounts of the Secretary-Treasurer of the Indiana State Dairy Association, beg leave to report that we find the same correct, as per exhibits, except voucher dated Jan. 8, 1897, $3.50 for letter heads, which is absent, but find copy certified to by the Secretary.

W. S. COMMONS,
"SAM. B. WOODS."

Mr. Moore: I want to ask this Association to hold its next meeting at Plainfield. Plainfield is fourteen miles west of Indianapolis on the Vandalia. There are good railroad accommodations and connections, Plainfield is a beautiful place, has a great many good people, and a large dairy interest is there. We would respectfully ask the Executive Committee to send the next meeting to Plainfield.

Mr. Billingsley: I had intended to invite the Association to our city (Indianapolis), and, in fact, we would be very glad to have it go there. At the same time we know that Mr. Moore has had this thing in his heart for two years, to have the Association meet at Plainfield, and I don't like to disappoint him. It is a very good section of the country about Plainfield; I am quite well aware of that, and I believe if you go there you will be right royally entertained. I would be glad to have you come to Indianapolis. There are some fifty in our Association, and we could give you a royal reception there, and we would be glad to have you there, but we feel that, under the circumstances, we will second the proposition to go to Plainfield for the present, and ask you the next time to come to us.

Mr. Drischel, of Cambridge City: I wish to represent the cheese factory industry of this State. This one here at Lewisville and the one at Cambridge City are the only ones I know of in the State. We would like to have this Association meet at Cambridge City next year. We have there an actual cheese factory running every day in the year, and it has met with success, and is giving satisfaction, and is proving that cheese products can be made here that will compare favorably with other States of the Union. We are in a position to give you ample hall accommodations and railroad facilities, and we would like to have it come to Cambridge City.

Mr. Holloway, of North Manchester: I would like to speak a word for the accommodation of the people from all over the State, by suggesting Wabash as a point to hold his next convention. It is not my town, but I am living near there. It is not in a very great dairy section, but it will accommodate what might be termed the two dairy sections of the State, better than almost any point I can mention. There are railroad facilities from the east and west and from the north and south, and plenty of trains and ample accommodations for all. As I said, I am not a citizen of Wabash at present, but I know they would be very glad to have you take this invitation into consideration.

Mr. Commons, of Centreville: I represent a part of the State that is thoroughly aroused and wide awake in the dairy interest of Indiana, and we have as successful a creamery, I expect, as there is in Indiana, and as fine a dairy community, and we understand entertaining our friends when they come there, and I guarantee that we can have as good a meeting at our place at any place in Indiana. Centreville is one of the most historical towns in the State of Indiana, the home of some of the greatest men that Indiana has ever produced, the home of the great War Governor, Oliver P. Morton, whom you all remember well. I think that when the Executive Committee comes to consider those points that Centreville will be remem-

bered as very important as a point for the next meeting of the State Dairy Association.

President Stubbs: Centreville had the meeting one year, and there are other places that have never had it at all, but still it will be referred to the Executive Committee. We will now continue the papers on the program by taking up the one carried over from yesterday, on

THE MANUFACTURE OF HIGH GRADE CHEESE.

BY O. J. RICHARDSON, LEWISVILLE.

Cheese-making is a process of fermentation, caused by the presence of certain bacteria in the milk; and right here I want to say that it is no part of the farmer's business to anticipate the cheese-maker's work by starting this fermentation, by introducing some of the bacteria peculiar to the stable and barn yard. The most expert cheese-maker that ever lived can not make good cheese from milk only fit for swill. Too many farmers lose sight of this fact, and seem to feel that the only thing required of them is to furnish the milk, and they pay the cheese-maker to do the rest. No one expects to gather "figs from thistles," neither can you obtain good results from poor milk. It is not necessary for the farmer to be a chemist in order to understand what good milk is; just plain, wholesome cleanliness will answer every purpose. There are various kinds of ferments which act on the cheese in different ways. The sole trouble in cheese-making is caused by the undesirable organisms which produce the composition. But while one kind of organism ruins the milk for cheese, there is another kind without which it would be impossible to make it, and for that reason the maker wants the milk delivered pure and sweet, so that he may have full control over it.

When milk is put in the vat and the steam turned on, a process of ripening or fermentation is set up by the action of the heat, similar to that which takes place in the bread by the growth of the yeast plant. Milk should be ripened to that point where, in two hours from the time the rennet is put in, there will be one-eighth inch of acid on the curd.

If we are making a cheese for export that will grow better the longer it is kept, we use enough rennet to coagulate in 30 minutes. We "set" the milk at a temperature of 86 degrees, stirring the rennet in thoroughly to mix it, then pass the dipper back and forth gently over the surface to keep the cream down until coagulation begins. The curd is ready to cut when it splits clean over the finer thrust in and run along under the surface. In cutting, we first use the perpendicular and then the horizontal knife. Some makers reverse this order, but that is a mere matter of a difference of opinion, and we could never see that it affected the cheese in any way. The main object is to get the curd cut into cubes of the proper size without bruising. Ninety-eight degrees will usually be found high enough to cook, if the milk is in good condition; but the maker must exercise judgment. When it shows one-eighth inch of acid we draw the whey promptly, and push the curd to each side of the vat, and leave it to mat. In a few minutes we cut it into blocks and lay them on the rack in the vacant end of the vat to further facilitate drainage. The temperature must be kept up so that fermentation will not be checked. In the course of an hour and a half it will have assumed a meaty texture, and can be pulled apart like the fibers of lean beef. It is then ready to grind. It should not be above 80 degrees when milled and salted, after which it should be thoroughly aired in a revolving curd stirrer. This airing is important, as it helps to expel any gas that may not have been forced out by the matting process. It is now ready for pressing, and by this time will have taken on an inch or more of acid.

Good cheese should be as free from holes as is a tub of butter, and there is no reason why it should be otherwise if due care is exercised in handling the milk.

The cheese-maker should insist on the patron bringing the milk in perfect condition, and the patron should insist on the cheese-maker having a neat, clean place in which to receive it and make it up.

Now our cheese is ready for curing and our work and care is all wasted if we have not a proper curing room. To cure properly, cheese must be kept at an even temperature, which is out of the question in most of the so-called curing rooms throughout the country, as they are nothing more nor less than furnaces in summer and ice boxes in winter.

It should be built, and the walls packed in such a way that the temperature will not be affected by outside conditions.

It would be impossible to estimate the amount of money lost to the dairymen of this country annually from this one cause. But the loss will contiune as long as existing conditions prevail, and these conditions will probably continue until butter and cheese companies awake to the fact that a cheese factory is something more than a shelter to protect the cheese-maker and his goods from the rain and the snow.

DISCUSSION.

Mr. Drischel, of Cambridge City: I can candidly say, from a practical standpoint, that Indiana can produce just as good cheese as New York or Wisconsin. We are having our product go into New York in competition with Illinois and Wisconsin. We are making a good, strictly full cream cheese, and to-day we can not supply the market with this cheese in as great a supply as the demand, which shows that the cheese business can be made a success and turn out a product fully equal to any in the Union.

Mr. Monrad: I would like to ask the gentleman how old his average cheese is when he sends it out from the factory?

Mr. Drischel: From the experience we have had, we would like to hold it six to eight weeks, but we can not do it, especially at the present time, because there has been such a demand for full cream cheese, and we are selling now cheese that is only two weeks old. The trade demands it. Nine-tenths of the trade in eastern Indiana demands a cheese two to four weeks old. We have educated them to some extent, but they want cheese that is comparatively new. We have orders to-day from whoesale groceries that want fresh, mild, selected cheese not over three weeks old at the outside. In the summer season we aim to try to hold them four weeks, but in the winter we would like to hold them six weeks.

Mr. Monrad: You do sell them down to two weeks?

Mr. Drischel: Yes, sir.

Mr. Monrad: And even less?

Mr. Drischel: Well, I draw the line on less than two weeks. The cheese is too new at that time, and doesn't give good satisfaction. In fact, we have been compelled to cancel orders from wholesale houses that demand cheese down below that time.

Mr. Monrad: You seem to imply that there is room for more cheese factories in Indiana?

Mr. Drischel: Yes.

Mr. Monrad: Don't you think it would be worth while to caution them that, while this quick cured cheese is all right for local sale, but still if you make a cheese in Indiana you have to export to other States, you will have to manufacture and make a firmer cheese.

Mr. Drischel: When the cheese manufacturers come to a point that they have to go to making shipping or export cheese, of course they will have to resort to something else. We shipped cheese to New York in March of this year eight weeks old, and that cheese went on the market in New York City as "fancy full cream" at the same price as New York full cream. That cheese was at least eight weeks old. There was a little stagnation in the market at that time, and in that way it was fully matured. Our trade demands at the present time a fresh, mild cheese. There is only one thing against us in this State in making cheese, and that is the climatic condition. From the middle of May until the middle of August the weather is against us. The farmer, as Mr. Richardson's paper says, should take pride in having good milk, and cleanliness is another thing the farmer should look after, and in that way we can ward off, to a certain extent, the disadvantages of this latitude. Our milk comes into the factory in May, June and July at about 82, 83 and 84 degrees. When milk is received at such a high temperature we are compelled to hustle from the time it comes in. We have placed six to eight tile from 100 to 150 feet from the building, and in that way have brought a cold air duct into the building, which I think will overcome the heat in the summer season and maintain an average temperature of 60 degrees every day in the year. The curing room is another important feature on this question.

Mr. Monrad: Do you use a starter in ripening?

Mr. Drischel: We have this fall for the first time.

Mr. Monrad: Are you satisfied with it?

Mr. Drischel: We have not used it enough to determine that.

Mr. Richardson: I would like to ask Mr. Monrad what he considers a good starter in the manufacturing of cheese?

Mr. Monrad: A good starter is a good starter, I don't care of what you make it. It is to have a clean, pleasant acid flavor. You can make it if you have a patron that is very cleanly. Heat up the milk to 85 degrees and let it sour. I am not afraid of milk getting sour. Some of the instructors are afraid of that and want to use it before it clabbers. I am not afraid so long as you do not disturb the clabber until you want to use it. Then you will have a smooth, soft, uniform mass, but if you disturb it before using it, the curd will harden, then you are liable to get white specks in the cheese. You have to be careful about that. You want to use the starter with judgment. You don't want to use too much. You can use your buttermilk for a starter.

Mr. Drischel: How far advanced should that milk be as a starter in cheese-making; do you claim it ought to be sour?

Mr. Monrad: The starter itself, yes, sir, and I say that while some of the instructors just want to get a sour taste to the starter, I am not afraid to use coagulated clabber provided you do not disturb it until it is put in the milk.

Mr. Richardson: I have used almost all kinds of starters, and among them I have used butermilk fresh from the churn, and it is my experience that there is no harm in using fresh buttermilk for a starter, if you don't use too much of it.

Mr. Monrad: Of course buttermilk has a good deal of acid, but my experience is that you can not always have your buttermilk in good condition.

Mr. Holloway: I am not a cheese-maker at present, but I used to be. In regard to putting in this starter, would you have your milk showing any indications of acid when you put in the rennet, or do you determine that by the rennet test? Those things have really come up since I left the business.

Mr. Richardson: I have never used the rennet test, although I believe it is a good thing. I have a friend who has used it.

Mr. Monrad: The Marschall test is, in my estimation, the simplest one there is.

Mr. Drischel: I wish to say to the Dairy Association, or the members of it who are now engaged in the manufacture of cheese, that the rennet test ought by all means to be put in the factory. It may be hard on the patrons, but they will come to the point of bringing in good milk, and thus you can make standard cheese every day in the year, and not discommode yourself or the trade.

Mr. Commons: I would like to ask Mr. Monrad if he would consider it advisable to manufacture butter and cheese in the same apartment, from the standpoint of flavor in the butter?

Mr. Monrad: If at the same time, I would not, but if it be run as a cheese factory in the summer and then cleaned up and run as a creamery in the winter, it might do. But actually, when one may make butter and cheese at the same time, I wouldn't like it.

Mr. Edgerton: I would like to ask that gentleman, who seems to have had so much experience in cheese-making, what he considers the relative proceeds from milk of the same quality, when made into cheese, as compared to milk made into butter. It is an advantage for farmers and milk producers to turn their attention to it and make cheese for the market. Would it yield more as an income than the butter project?

Mr. Drischel: My experience is that when creamery butter in New York is worth 26 cents the cheese factory can not follow them in prices. But to-day, with butter at 24 cents, the cheese factory can get along; at least, in the last three years they have been able to pay the same prices that creameries do on the same basis. Where you can produce four pounds of butter at 24 cents you can produce at least 11 pounds of cheese, which you can sell at 9 or 9¼ cents. We are actually getting 12½ pounds of green cheese from 100 pounds of milk. We have run as high as 13 or 13½ pounds.

Mr. Edgerton: If butter is selling at 24 cents you can make cheese and get some profit?

Mr. Drischel: Yes, our experience has been up to 24 cents in New York, and I believe all the creamery men in the State base their prices on New York quotations.

Mr. Edgerton: And if butter is 24 cents, butter will yield a little more than the cheese?

Mr. Drischel: Yes, sir.

Mr. Edgerton: Just a variance of 2 cents will determine the scale.

Mr. Drischel: Where butter is 26 and 28 cents in New York, we have not followed the creameries in prices.

Professor Smith: I would patronize the creamery and feed the skim milk on the farm rather than sell to the cheese factory.

Mr. Roberts: I don't believe that any man in Indiana can buy skim milk at 20 cents a hundred and feed it to anything we have now and make a profit.

Professor Smith: I fed 165 pigs on skim milk. The last we paid for skim milk was 17 cents a hundred. We took pigs weighing fifty pounds or thereabouts and fed them skim milk and sold them at $3.80 a hundred, and the milk brought us 19.9 cents per hundred. When we fed it to pigs weighing from fifty pounds to seventy-five and fed it with corn meal, and sold the fatted hogs at $3.80, the last week, we got for the skim milk 12 cents a hundred, and ranging up to 26 cents, varying with the kind of pigs to which we fed it. I use $3.80 as the selling price of pork right along. When we fed it to pigs weighing 180 to 200 pounds, the milk only brought 12 cents a hundred.

Mr. Monrad: You forget the value of the whey, and I think 20 cents rather too big a difference. If you take proper care of the whey, it is worth pretty near half the value of the skim milk. I would discount you down to 10 cents.

Professor Smith: Oh, but Mr. Monrad, there is so much water in the whey.

Mr. Drischel: Mr. Plumb will verify my statement that skim milk at 3 cents will probably bring 14 to 15 cents, from his experiments. We consider the whey fully equal to the sour skim milk.

President Stubbs: The next topic on the program is an address on

THE WORK OF THE STATE BOARD OF HEALTH AS AFFECTING THE STATE'S DAIRY INTERESTS.

BY DR. J. N. HURTY,
Secretary State Board of Health, Indianapolis.

The State Board of Health is intimately connected with the dairy interests everywhere in this State. You know how much the public health depends on the milk that is furnished the people, and the butter and all dairy products. I do not know as I can present what I have to say in a better way than to detail an actual experience.

It was in September, 1895, that a telegram was laid upon my desk at Indianapolis, coming from the health authorities of Chicago. The telegram read: "We have excluded Lake County milk from Chicago because typhoid fever has been traced thereto. The quarantine will be raised on your written statement that there is no longer any danger from typhoid in the milk from this county." Hardly had the telegram been read before another one was brought in by a second messenger, which was from the health officer of Lake County. It read: "Lake County milk unjustly excluded from Chicago. Come immediately." I was ordered by the President of the Board to take the next train for Chicago. I arrived there the following morning, and immediately called upon the health authorities to find why it was that a thousand dollars' worth of milk a day was refused admission to that city. The health authorities were ready for us. They had their evidence all written out. It stated that seven cases of typhoid fever had suddenly sprung up on Champlain avenue. They had scientifically investigated the source of this typhoid. They have enough of that disease in Chicago; it is in their water supply, as we all know. But they eliminated that, for the Board of Health of Chicago has been pounding away at the people for many months, telling them they must boil their water, or else run the risk of having that very destructive and expensive disease. So these seven families had boiled their water, and had taken other precautions against typhoid fever. The only loophole that was open was the milk. The milk was purchased by these seven families from a certain milk depot; that depot was supplied from Lake County. The health officer had been sent to Lake County and had found typhoid at two dairies, and he had so reported. Chicago could do nothing less than to exclude the milk. Each case was set forth by the officer most carefully, thoroughly and exhaustively. I retired with this evidence.

I went over to Crown Point and there viewed a remarkable scene. The platforms were covered with milk cans, filled with sour milk. Dairymen and farmers were standing around with their hands in their pockets, wondering what in the world was going to happen. They immediately pounced upon me when they found that I was the State officer, and demanded that the embargo be raised right off. That, of course, could not be done. It would be necessary to investigate every dairy and eliminate those that could possibly, in the remotest degree, send typhoid to Chicago. An inspection of the dairies was immediately commenced. The first dairy was a rather clean one, and there was no sickness there, but the dairyman had his well right in the middle of the barn yard, and by the most superficial inspection one could see that the drainage from the barn lot was running into the well. Whether typhoid came from that dairy I do not know, but filth certainly went to Chicago from it. His barn was dirty, the manure was a foot deep, and though there might have been no sickness at that place at all, yet that man could not have given me his milk, and neither would I feed it to my children were he to pay me a very large sum to do so. He was told that his dairy must be put in sanitary condition before we would give him permission to send his milk to Chicago.

So we went on from dairy to dairy inspecting them. Some we found in the very pink of perfection, perfectly clean, supplied with good water, clean and wholesome and well-aired milk houses, clean and wholesome cattle and stables. Of course we set down those dairies as having no sickness at all, nor had there been any, and the whole surroundings at those places would show that intelligent, cleanly, upright men lived there. I say upright, because you know cleanliness is stated to be next to godliness, and the more filth you have the further you are from godliness. I have no doubt that is true. We at last came to E. Wild's dairy. He had a pretty good barn, but it was filthy, and he lived in a miserable house, and lying in his house was a daughter dead with typhoid fever. His wife had died just three weeks previously from the same disease. One daughter had recovered.

It is unnecessary to describe the unsanitary condition of that dairy and that farmer's premises. They were too dirty to set before you. He had reaped the harvest which he had sown.

We went to another dairy, and we found that typhoid fever had been there, but the patient had recovered, but still it was dirty and filthy. So from dairy to dairy we went, finding some of them cleanly and in sanitary condition.

For four days, each day 12,000 gallons of milk had been excluded from Chicago, and why? Two men in Lake County were filthy and dirty, and I will say ungodly. It had been their choice to keep dirty, nasty dairies: they had invited typhoid, and nature had promptly sent the disease. It was from those dairies, I presume, that the disease had been transmitted to Chicago, and caused death and disease there.

Now what is the lesson, and what connection has the Board of Health with this? Everything; for it interferes with life and liberty and the pursuit of happiness of the people for a man to keep a dirty dairy, or dirty premises anywhere. The clean dairymen there were directly interested in seeing to it that every dairy was clean. It was their business to have a local association, and it was their business to wait on E. Wild and then and there tell him that he must keep a clean dairy, and that he must not in the remotest way do anything that is likely to threaten the life and health of mankind. But they didn't do that, and that was a sin of omission on the part of the cleanly. Had they done so, and it was clearly their duty, all that loss would not have occurred to Lake County. Chicago had a right to exclude that milk: it was her duty to do so, no one will question that. How is it to-day? Fully two years have elapsed, and still Lake County milk is under a ban in Chicago. The better families will not buy it. The stigma is on it, the scar is there, and those farmers are still working under that load, that burden, that Lake County milk once had typhoid in it. Of course, it is unnecessary to dwell upon this lesson.

Every dairyman who keeps a clean dairy is interested in his brother keeping one. He has a direct financial interest in that, and above and beyond that he has a moral interest. You are well aware, no doubt, how easy it is for milk to become poisonous.

There is a classical story unquestionably familiar to many of you, but assuming that some have not heard it, I will detail it. This occurred in Michigan. Prof. Smith, of course, is well acquainted with it. A farmer by the name of Evans, a thrifty and energetic man, desirous of getting on in the world, had purchased a farm that had upon it an old house, which had not been occupied for some time. He moved into that house with his wife, daughter and two sons, and they went to work with hearty good will to pay for the farm. But the house was old, it was unsanitary, and they could not afford, they said, to make it clean and in sanitary condition. Now let us see whether they could have afforded it or not. What happened? In their pantry, nearby where they kept their milk and their food there was a double floor. The house was a poor and old one. One floor had been put over the other. They worked along there for only a few months, and one day the father was taken with symptoms that closely simulated arsenical poisoning. There was vomiting, and retching and most serious symptoms. A physician was called, and he was puzzled, though he immediately recognized that Evans was poisoned. In a day or two the oldest son was taken with the same symptoms, and then the mother and then the daughter; and, to sum up the whole story, the mother and son and daughter died. The father, alone, after struggling with the poison for a long time, survived.

Whence came all this trouble? It came from the milk they drank. And how do we know? It was no guess work. It was not an opinion based upon a cursory examination or inspection of the premises, but it was a conclusion arrived at after the most careful and exhaustive scientific examination of the subject. Prof. Vaughn, the eminent professor of sanitary science in Michigan University, at Ann Arbor, found out the cause, and was able to repeat it again and again. He visited the premises and inspected them carefully. He instituted a series of experiments and found that all milk placed in that pantry would become poisonous within a certain time, and he could take that milk and poison animals with it, while the same milk, if kept without that room, in other places, in the spring or well, remained wholesome and good. The poison proceeded from that pantry. It was scrubbed well, both the floors and shelves, but between those floors—for, as I said, you remember, there were two floors—was found a lot of sodden filth, and in that and from it proceeded certain bacteria, which got into the milk, and generated a poison known as tyrotoxicon. That was what destroyed that family and ruined it utterly. An expense of five dollars would have prevented it all. That poisonous condition was simply due to a lack of cleanliness, that cleanliness which we will insist again is next to godliness.

Cincinnati also demanded that I visit Indiana dairies. I will not mention the names of the towns in this instance, because my report is not ready for publication. I got a letter only three months ago from Cincinnati saying that there was dysentery and diarrhea and intestinal disorders there, undoubtedly proceeding from certain Indiana milk, and their inspectors had discovered that the Indiana dairies were filthy and unsanitary to an unusual degree. The letter stated also: "This milk will be excluded from Cincinnati within two weeks unless said dairies are put in sanitary condition. At the order of the Board, I immedately visited the dairies. What did I find? In one of them, where some 170 cows were kept, the milk house was a miserable frame structure right in the cow yard. Very recently a cement floor had been put in that milk house. The water supply for the purpose of cleaning the vessels, milk cans, and so forth, was taken from a well in the lower corner of the barn yard. The drainage from the manure and the filth of the yard trickled down into that well, and yet with that water that dairyman was not scalding; he was rinsing and scrubbing his cans, and he would rinse them with that water and then turn them upside down to drain, leaving, of course, a few drops of water in the joints and seams of the cans. Then the milk was put into those cans, being drawn from the animals in a filthy barn reeking with the odor and filth of animals so close together that they would have to be pushed aside like a "V-rush" to get at them to draw their milk. They looked well and were well fed, but they were in an unsanitary condition. It was a filthy, rotten dairy, sending milk to Cincinnati for food. Think of it! It was causing diarrhea, dysentery and indigestion; it was causing death and breaking up homes and bringing sorrow everywhere that it went. That was what that dairyman was doing.

Every one who is here to-day has an interest in the dairy and in seeing that it is kept clean. This is true not only in morals but also in a pecuniary sense. Some people would be dirty in spite of everything, and some dairymen, and my work will be good if I can incite 10 per cent. of those present to become interested in this matter, and see not only that their own places are kept perfectly clean, but that none of the conditions exist that will poison milk, butter or cheese in the slightest degree. Then, after they have done that, they will become their brother's keepers and look after their brother's dairy and form an association, a sanitary association, the object of which is to save life and money and practice real Christianity.

I presume you have all read of the experiment of Nathan Straus, of New York, who, with sterilized milk alone, reduced the death rate in a certain locality in New York. That philanthropist selected a section in New York, and secured the aid of the health authorities. Said section consisted of about four squares. The death rate of that district was known; the amount of sickness there was known and carefully noted. He then established a milk laboratory and furnished milk to the section at one cent a bottle, which cost him four cents. He made them pay something for it, so they would value it. His total experiment cost $50,000 or $60,000. He furnished them sterilized milk for two summers. What was the result. The figures show that sterile milk alone reduced the death rate among the children enormously. The sick rate was also reduced. That could all have been done had the milk proceeded from clean dairies, or the greater portion of it, for you know that sickness has been proven to proceed from milk directly, and that it was caused by certain bacteria, born of the dirt which comes into the milk at the dairy.

I think this great lesson will be heeded in time, but why can't we take hold of it right off? Why can't we practice this economy, for a dirty dairy is the greatest extravagance that can be. It is a waste of money; it is immoral; it is wicked; there is no Christianity in it whatever; you continually injure your health, and health is at the bottom of all society. With a few cholera microbes we can go into any city, and paralyze that town within a few days. Health is at the bottom of all prosperity. Why

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should we live if we do not have health? The care of the health is a public question too, for while there are some people who will pursue sanitary methods without compulsion, there are others who must be compelled. There are some people that are honest without compulsion, but because there are some people who will be dishonest and thieving, we must have laws against thieving. It is the same way in sanitation. A man who is moral and a true Christian will be clean. He needs no law, but there are many who must be compelled, many who must be clubbed to do that which is right in the matter of cleanliness. However, all the laws the Legislature can pass will be entirely without effect unless the people see their utility and importance. Indeed, in the work of the Board of Health, although ample power is granted from the Legislature to the Board to walk into any of your dairies, and dictate to you absolutely what you shall do, yet it doesn't propose to do its good that way. It would be worse than foolishness. You must be impressed with the necessity of good sanitation, and when a certain remnant or percentage of the community has at last arrived at that state where they understand that cleanliness is absolutely necessary for success and right economy, then the Board of Health will have in that community enough persons to sustain it in its efforts, and the law can be put to those who will not be clean. So you will see the relationship between the work in which you are engaged and the health and wealth of the community, for you may build up your industry as high as you please, but if you kill my child, if any of your products cause the death of a member of my family, I will say it is all in vain. We have to take these things home to ourselves in order to understand them fully and completely.

While I am on the floor I want to speak of one more point. It may be foreign to the dairy interests, but it directly affects your pockets and your happiness. To every man and woman who have children in the schools I want to seize this opportunity to bring this matter before them. In the inspection of the school houses of Indiana from a sanitary standpoint, I am compelled to say that probably eighty per cent. of them are absolutely unfit to hold school in. You say, "How comes this wholesale assertion from that man? What evidence has he; what facts has he upon which to base such a wholesale statement as that, when we see the health is pretty good? The scholars are not affected; we have no epidemics here, there and elsewhere, and why should he say that eighty per cent. of the school houses of Indiana are really unfit for children to be in?" Let me briefly relate. Let us take the ordinary country school house. It has one room. The children are in there for six hours in the day, or five hours at the least. The conditions which surround a room filled with children are entirely different from those which you obtain in a room at your home, and out of those school rooms frequently come cnsumption and catarrh, disease of the air passages, nervous disorders, indigestion, and all manner of obscure diseases, and vital depression. And why? First, they are not clean enough. Second, they are not lighted properly. Third, they are not ventilated properly. Fourth, they are not heated properly. Let us take the last point. Any school room that is heated with a stove, and occupied continuously all day by children, is bound to produce ill results. Why? Go into your school rooms and you will find the stove in the center of the room. The children sitting around the stove are too warm; they are covered with perspiration as on a July day. The children at the windows are too cold, and are chilled. So all the children in the room are laboring under a disadvantage. The children who are too warm and who are covered with perspiration are liable to go out at recess and get chilled and receive a shock, and have a cough and cold, and diseases of the respiratory organs. The children away from the stove, because of the improper manner of warming the room, will have a draught from the window let down for ventilation, and they thus receive a shock, resulting in coughs and colds. This is because you have violated every condition of health and invited the very conditions which produce disease. When we endeavor to warm a school house by an ordinary stove placed in the middle of the room, we produce coughs and colds. School houses should be heated by ventilating heaters set off in one corner, that take the air from the outside and then distribute it through the room, and in that way give an equitable temperature. If you do not supply each child with two thousand cubic feet of air every hour, you place an embargo upon the health and mental condition of the child. The child produces poisonous gases from its own lungs, and unless it has fresh air, it cannot study well. Memory is affected, progress is retarded. Do we tax ourselves for school money to retard the progress of the children, and to surround them with conditions to injure their health? Of course not.

How should the school room be properly ventilated? The bad air should be taken out of the school room by registers in the floor. The building should be set about two feet above the ground with a brick foundation all around, and underneath it should be constructed a flue which will suck the air from underneath the building and take it out of the room, causing a full circulation of warm air all through the room, without a draught, and without having an unequal distribution of heat. You can thus introduce for each child the required amount of air, just as cheaply as you furnish bad air to each child now. My word for it, our schools in Indiana unnecessarily kill from 300 to 400 children annually. If I could prove that to you, you would say, "How uncivilized, savage and barbarous we are!" All I desire is that you enter into a study of this subject, and if you want to practice economy, morality and practical Christianity, give the children good school houses, and keep clean dairies.

Mr. Woods: I want to say that I come from Lake County, and I know what Dr. Hurty has said about the conditions there to be a fact. That was the condition, and that condition is serious in the milk-shipping business, as well as in the creamery and cheese-making lines. It looks to me just as important that our cream should be free from disease as that it should test high with the Babcock test. We ought to have a law compelling a man to keep his milk in proper sanitary condition. I would like to ask the doctor what the laws are in this State in that respect; I don't know.

Dr. Hurty: The State Board of Health has ample power to invade every dairy and make them do so and so. It is very easy to say that, but how difficult it is to do it! I told you the Cincinnati story. The man that keeps that dairy is high up in political influence. We can go to that county and try to have him indicted for breaking the sanitary laws, and threatening the health of others, but to convict him I warrant you would be a very difficult job indeed. The grand jury may refuse to indict him. That is the way courts work, and they work that way because there is not a saving remnant in every community of sufficient size to uphold such a movement. This dairyman will not clean up his dairy and obey us, and he threatens to go to Cincinnati and pull political strings in order to keep the authorities from excluding his milk. Suppose he does that? I think he is trying to do it. He wants to get the health officers discharged down in Cincinnati, and he will pull political strings all through Cincinnati until he gets them discharged. Now, let us go in there and try and get him indicted by the grand jury. Will we succeed? No. It is futile to try to do it. We must educate the people in the community to see that it is extravagance that a man is practicing; it is immorality; it is not practical Christianity—not Christianity of any kind. Such a man is in fact the enemy of the community, and until the community, or the influencing portion, understand that that is immorality, that it is an extravagance and blight upon their community, we cannot do anything with the law, although we are given power to issue orders, and presumably they must be obeyed. We can bring some cases, but we must get each community educated up to the point of demanding that these things shall be done, and then we can do them.

Mr. Billingsley: I am very glad to hear this talk from Dr. Hurty, more especially as the doctor is directly interested in our city, as well as some more of us. A few months ago we organized a dairy association in our city (Indianapolis), in view of the fact that there was a need for some sanitary regulations, and we have progressed so far that we have secured the hearty co-operation of the City Board of Health, and they have offered to have our herds examined, believing that the basis for good, wholesome milk is a healthy herd to begin with. We have started out on that proposition, and we have secured an arrangement with the City Board to have the herds all examined within a range of two miles of the city, and at the expense of the city. We have quite a number of dairymen, and, perhaps, the majority of them will not have their herds examined unless they are compelled to. We have no law now that compels them to be. We need such legislation, and we need it very much, in order that we bring the milk furnished to the citizens of Indianapolis up to the highest standard of excellence. Some of our dairymen laugh at us. Our association numbers perhaps fifty or sixty members, and they are heartily united in this work. Some of them did not realize its importance in the beginning, but as we have grown and gone along, they begin to see the necesisty of it. Now, what we really need is to have a law with which we can compel every man who sells milk in the city of Indianapolis, or in any other large city, to have a certified bill of health, and unless he does, his milk should be excluded from the market. I hope we may reach that point in Indianapolis when every dairyman that sells milk there shall sell certified milk. That is what we are looking for, and we are going to get there.

Nathan Gause: I want to speak in regard to that locality in New York where, by the increased drinking of sterilized milk, the ratio of health was enlarged. I think this condition has been largely caused by the abstaining from alcoholic drinks to a greater extent than before, and a corresponding increase of the drinking of milk. It is poisonous liquors—beer and alcohol—that brings death and damnation, and as the drinking of these has decreased, health has increased.

President Stubbs: The next subject on the program is an address on

THE FACTORS ESSENTIAL TO SECURE PROFIT IN THE DAIRY.

BY PROF. C. D. SMITH,
Agricultural College, Michigan.

In the few brief moments accorded me I desire to speak of some parts of the dairy work that are liable to be overlooked because considered relatively nonessential. I want to graft what I have to say directly on the address of Dr. Hurty.

He has told you something about the nasty conditions that obtain in some Indiana dairies, although, thank Providence, their numbers are few. He has told you of cows with filthy sides, which were undoubtedly milked unbrushed into dirty pails, and the product sent forth unstrained into the city. Now it is part of my province in Michigan to go about the country lecturing on the maintenance of soil fertility. I have studied the subject somewhat thoroughly and I am prepared to say that it is worse than folly to hope to maintain the fertility of Indiana farms when so much cow manure is shipped away from the State in the milk. The first question to which I shall address myself is, therefore, how to save this element of fertility on the farm, where it is needed, and keep it out of the milk, where it is worse than useless.

In the first place, the only way by which you can keep the milk clean and free from filth at the outset is to keep the sides and udders of the cows clean and free from filth. If the cow is allowed to lie in her own droppings, if her flank and udder are covered with dried excrement, no man can milk from that cow clean milk, fit for butter-making or for sale. How shall we keep the cow clean? Evidently by the use of proper stall fixtures, by the adoption of some method of fastening the cow that will prevent her soiling herself. Various devices have been put forth for this purpose. We have tried many of them at the Michigan Agricultural College, and have adopted two. The one is a stall in wihch the cow stands untied and is prevented from backing into the gutter by a rope or chain stretched across behind her, is prevented from turning around by the narrowness of the stall and from going over the manger by a fence across in front. This stall is a patented affair, and the patentee is Porter Bidwell, of McGregor, Iowa. We have something over forty of these stalls in use, and I am ready to report that they are very efficient. No udder is ever soiled with the droppings of the cow and it is very seldom that there is any spot on her thighs that is at all contaminated.

Another stall that we have tried with good success is called the Hoard stall, because invented by the best friend of all dairymen, Ex-Governor W. D. Hoard, of Wisconsin. I have not time to describe the stall in full. It consists in brief of a board partition four feet high, erected in front of your row of cows. On the side next the cow and thirty inches from the floor there is nailed a plank eight inches wide, which serves as the bottom of a very slanting rack. Upright slats are nailed on the sides of this plank next the cow and extending to a two-by-four which is on a level with the top of the partition and at least two feet from it. This makes a rack very slanting. These slats are left six inches apart. The stalls are three feet and six inches wide, using any kind of partition that you like. The cow is tied to a ring in the middle of the stall and on the eight-inch plank at the bottom of the rack. As she stands with her head almost against the rack, a two-by-four is nailed crosswise of the stall in front of her hind feet. In front of this two-by-four the floor is covered with bedding. When she lies down the cow's head will go under the rack and she will lie on the bedding. When she stands, her droppings will fall behind the two-by-four. She is fed her grain and silage in a box about four feet long and fourteen to sixteen inches wide, which is thrust into the stall from the feeding alley through a hole cut in the partition below the rack, the bottom of the hole being about six inches from the floor.

The use of this or some similar device will secure comparative cleanliness on the part of the cow, but the milker should always carry with him a brush to remove the loose hair and other adherent dirt from the udder before he milks. The owner should provide these brushes and every convenience for securing their use. In warm stables, and with good supervision, I recommend that the udders be dampened with a sponge at milking time, but this operation is very apt to be abused.

It goes without saying that the tin pail into which the milk falls should be scrupulously clean, the seams free from that sticky, yellowish matter that indicates a lack of thoroughness in the washing. We never use soap in washing milk utensils. We wash them with a brush rather than a cloth, and in the very hottest sal soda water, after rinsing off the milk as thoroughly as possible with cold or tepid water. Next, we thoroughly rinse with water as near boiling as possible, and finally steam thoroughly if we have the steam.

If the milker and the cow and the milk pail are clean, we nevertheless must strain the milk. We used to strain through a conical strainer, with wire cloth in the bottom, and sometimes put two or three thicknesses of cheese-cloth below, to catch anything that might pass the wire cloth. After the milk of three or four cows had been strained through this apparatus there would collect on the strainer a certain amount of filth, and the successive messes strained through partly dissolved this stuff and carried it through the milk. Hence in later years our men strain the milk through three thicknesses of cheese-cloth, cut about eighteen inches square and put over the top of the strainer, being held in place by a string around the outside of the conical strainer. A piece of elastic is tied in the string to obviate the necessity of untying it on each change of strainers. These cheese-cloths are changed as often as necessary to provide a clean strainer at all times.

I have not time to speak of the points in the selection and use of feeds to produce economical results. The profit in the dairy hinges very largely upon the ability of the dairyman to select good cows along the lines pointed out last night and the careful selection of feeding stuffs which shall produce rations at once economical and reasonably well balanced. I plead for the dairy cow, that her owner shall act more intelligently along these lines.

In the last analysis the success of the dairy business depends as a business on the business sense of the dairyman himself; not primarily on brain power but on an indefinable something that for want of a better term we call business sense. A very brainy man may be a business failure. A very brainy man may lead a successful life and yet make a very poor fist of it as a financier. It by no means follows, in other words, that because a man succeeds or fails financially he thereby possesses more or less brains. If financial success was measured by brain power alone, a good many of you that are here before me to-day would be rich men, but it is not. This business sense is something that can be cultivated, and the successful dairyman, possessed with this business sense in abundance, will be receptive of new ideas, will be progressive, will be a reader of dairy literature, and will be wide-awake on all dairy topics. Finally, the successful dairyman will be a man of patience. His cows give milk seven days in the week; he must himself work three hundred and sixty-five days in the year. I used to think the dairy business the most confining of any in the world until I talked it over with a friend who had been successfully engaged in mercantile pursuits for many years in a city. He told me that I, a dairyman, did not know what confinement to business meant, that he knew no peace from early morning until 11 o'clock at night. Every day he must be at his books without vacation and without relief. His success depended on it. Then I saw that every business to be successfully managed requires the devotion of the whole man to its prosecution. If the dairyman is born with an innate love for cows his greatest pleasure will be to keep them comfortable. To him no work seems arduous or confining that contributes to the comfort of his herd and thus indirectly to his own profit.

President Stubbs: Owing to the fact that Profs. Smith and Hacker and Dr. Bitting find it necessary to leave on the noon train, it will be necessary to push the program this morning in order to get through in time. So we will now postpone discussion and listen to an address on

PROBLEMS IN FEEDING.

BY PROF. T. L. HACKER, MINNESOTA.

As I have not formulated any particular line of talk, I will simply touch upon the feeding problem from an economic standpoint, which carries out Prof. Smith's paper, probably in a little different way from what he had intended. He has shown you how important it is to properly care for the cow, and for the milk. Now comes the question of feeding that cow in such a way that we will realize the largest return for the food consumed, and labor performed. After all, that is the business end of this work. We may feed in such a way that we will get a fairly good return from a dairy cow, and yet at the end of the year when we balance up the ledger account, we find that she has returned us a small net profit, as you saw from the statements last evening. I wish to call your attention to just a few points which I consider most essential. In giving our statistics for the last four years, and especially the details for the two years' work, you will notice that our records do not show as large yields as they have attained at the Michigan station. You should bear in mind that we are, as a rule, feeding small cows, 900 and 1,000-pound cows, while they were operating the larger machines. I would like to have heard some of the figures that I presumed Prof. Smith would present on the cost of production, because I am exceedingly interested in this subject; not that I care to show I am making a better record than anybody else, but I want to succeed in bringing the largest net return possible from the dairy cow. Now, we find that a cow needs a certain amount of food per day to do a certain amount of work. We must so feed that the cow will have exactly the material in that feed that she needs with which to manufacture milk, and support her body. I want you to bear this point in mind—you ought not to feed anything into that cow she has no use for. You should not ask that cow to work through the digestive tract a lot of rubbish and raw material she has no use for. It requires about as much energy to get rid of the poor material—material she has no use for—as it does to work through good, wholesome and nutritious food. We find that a cow needs about two pounds of digestible protein. This is considerable below the standard, and you will remember Prof. Smith told you last evening he requires 2.08 pounds. There is a slight varation in that, but that is about the amount in round numbers. Now, if you feed a pound to the cow only, that cow can give you only half a day's work. That is very simple, for she needs a certain quantity for herself. According to recent experiments, she needs .29 to .30 of a pound of protein per thousand pounds for food and maintenance. Now, if she needs that much for herself, and you feed one pound of protein a day, you have only about .6 of a pound she can use for converting into dairy products. This is not enough to perform a half day's work in the dairy. After a few years of work and the close record we have kept, we have come to the conclusion, in a sort of general way, not by way of experiment but by observation, that the value of our food stuffs can be approximately or almost accurately measured by the amount of digestible protein they contain. Of course animals need a certain amount of carbo-hydrates, or meat-producing elements, a certain amount of fat in the food to lubricate the digestive tract, but in examining the analyses of our food stuffs, we find that in all our ordinary foods raised on the farm, there is contained a larger percentage of those materials than the cow has any use for. So we conclude, if it is always there in abundance, just as the water and the air and the light is supposed to be always present in abundance, that we need not take any notice of it in calculating the value of food products. We have, therefore, based the valuation of food stuffs upon the digestible protein they contain, and with that as a basis we have compiled a table showing the comparative value of the different kinds of food. I wish to call your attention to just a few of these items. Men have some very queer notions in regard to the value of feed. It is universal among farmers that they want a heavy bran, a bran that carries a great deal of what they call middlings in it. Now, as a matter of fact, that is the poorest bran that you can buy, because those white particles in that bran contain starch, and you have more of that on your farm in your fodder corn and oats straw and wheat straw than you can make use of, and there it is cheap and in a digestible form. So, when buying mill feed or grain feed, why buy that which is scattered all over your farm in abundance? What is the ordinary price here of bran?

A Voice: Eleven and twelve dollars.

Prof. Hacker, continuing: We will assume bran is worth twelve dollars per ton. According to the general analysis of our food stuffs in the northwestern portion of this country, the percentage of protein is probably a little higher than here. We find barley worth 22 cents a bushel. If you can get more for your barley in the market, the thing to do is to sell your barley and buy bran, and especially would it be an advantage to do that if you are feeding corn, where the carbo-hydrates add a great deal larger percentage than you can use in your ration. When bran is worth twelve dollars, corn is worth 25 cents a bushel, a trifle more than your barley, but there are 56 pounds in a bushel, as against 50 in your barley. So, pound for pound, the barley and corn are practically the same. Corn and cob meal is worth 22 cents. Oats for feeding purposes is worth 14 cents, when bran is $12 per ton.

A Member: Ground or unground?

Prof. Hacker: I care not how you have it. It is in weight. There is probably no one feed, barring shorts, where there is such an error made in judgment in the feeding value for cattle as oats. We find that the ordinary market price puts it beyond our reach. I have, at the Experiment Station, about a half carload of oats left that I bought two years ago at 14 cents a bushel, and I thought that was very cheap, and I thought I would be able to use it. I used it the first year, but I have not been able to use it since, because oats have gone up to 17 cents, and I must charge my cows up with what it is worth to the farmer at his station. At 17 cents it would make my ration cost too much money. We are very careful in deciding what we feed during the winter, because we want to feed a ration that contains all the nutrients the cow needs, in the right proportion, and that it shall be the cheapest ration that can be compounded for them for that season at the ruling prices. You probably noticed in our talk last evening how cheaply we produced butter. This is accomplished because the cow is furnished just the ration she needs, and yet the very cheapest material. Last winter we had to eliminate oats from our ration because we could not even afford to feed 14-cent oats. When bran is worth $12, peas are worth 56 cents a bushel; rye 28, as against barley 22 and corn 25. There is one point in regard to rye which I wish to touch upon, and that is, while it analyzes well, it does not feed well; not that the cows cannot get as much of the nutrients out of that per pound as out of other food rations or stuffs, but because, as a rule, cows are not fond of rye, and they will not eat as much rye, and they will not eat it as continuously as they will barley and corn. The next we will take is shorts. When bran is worth $12, shorts are worth only $9.60 per ton. Do not forget this, because it is true. There is no mistake about it, but, mind you, I am not feeding pigs—I am feeding dairy cows. The work of the Minnesota Station is divided up this way: Animal Husbandry, in two divisions; Meat Production, Prof. Shaw; Milk Production is assigned to me. When bran is worth $12 a ton, wheat is worth 30 cents a bushel for feeding purposes, and almost the same for bread. The more we examine into these things the more unreasonable I find our methods of cooking and eating. We talk about feeding a ration to a calf or cow, or even to a hog, but poor man has got to go it blind. (Laughter.) I think we ought to revise our method somewhat in that respect. We ought to pay more attention to our own food. There is no use for a man to fill himself with a lot of fat the way he does. He has no use for it. What we need is more clean, wholesome, digestible muscle-making protein in our food.

Mr. Monrad: Cheese.

Prof. Hacker: Yes. Sometimes I am tempted to tell what I think as between butter and cheese, but I guess I will not say anything further on that subject. When bran is worth $12 a ton, cotton-seed meal is worth $30; linseed meal, $26; or, in order to remember it, you might say, in round numbers, linseed meal is worth twice as much as bran, and it is worth enough more to pay you to go to the market and get it. Let us examine roughage a few moments. I have made a standard of our rough food—timothy hay. I did this because I thought it was the most common food stuff we have. What shall I call it worth?

A Member: Six dollars.

Prof. Hacker: When timothy hay is worth $6, clover is worth $13.41. Corn stover, when cut reasonably early, is worth $3.50, a little more than one-half as much as timothy. Fodder corn is worth $4.59, as against $6 for timothy. Millet hay, $6.88; prairie hay (you have no use for this), $6.17; the mixed medium lowland is $6, and the sage grass is of the same value, $6 per ton—the same as timothy, strange as it may seem.

Mr. Edgerton: What do you mean by corn fodder as differing from stover?

Prof. Hacker: It is corn planted so it will not ear out or have small nubbins on it. The way we plant it, we have the rows about 36 inches apart, and either scatter it quite quick in the row or use a single Keystone drill. I think it has discs that drop the corn every two inches, and we run two rows only about seven inches apart, and then within forty inches two other rows, and so on. We have been experimenting with corn-planting for three years in the different methods of planting, and the further we are getting along with the work the more it begins to look as though if it is planted too close to form an ear, it will nevertheless, if it has sunlight between the rows, gather as much protein as the plant will if it is allowed to mature the ear, but the protein will be in the stalk, and in the leaves, and not transferred from there to the kernels, as is the case when it is planted in hills. Now, we have this advantage—we have no corn to husk, we have no corn to grind, and the cow does not have to do as much work in digesting and in assimilating the protein in the fodder corn as she would if it is in that hard, almost indigestible kernel of corn. It becomes too hard, and the cow can not masticate it sufficiently so the digestive tract can handle it.

There is but one other point I would like to touch upon, and that is the general idea that prevails among farmers that cows ought to be turned out into the field to roam about among the corn stalks. It is a fact that the average steer, if allowed to travel all day on a highway, if that is his work—or if he is driven over a journey which requires a whole day, even if he does not draw any load—uses the food he eats that day in the expenditure of muscular energy. If so, why not the cow, when traveling from hill to hill trying to gather a few husks with which to fill herself and stay the hunger; and not only that, but she has to constantly contend with a raw, cold wind. Here you might think the weather is not very bad, but for some reason or other a raw wind is very objectionable to the dairy cow; some way or other she feels it and dreads it. Our cows in the spring hover behind a little cluster of trees, to get out of the wind, and to accomplish this they would rather go without anything to eat.

Then, another point. If you allow your cows to wander about the field during the day, and they find something with which to fill themselves, they have no room for a good, wholesome meal when they come home in the evening. Consequently they can eat but little of the nutritious food you have for them when they come home.

We adopt this plan: We feed our cows two meals each day, one early in the morning and one in the evening. We milk while we feed, not because that is the only way, nor even that we claim that it is the best, but it is to us the most convenient way. We have the cows milked and fed by students of the school of agriculture, so we must adjust our methods somewhat to fit in with their school work. So, at 5 o'clock in the morning we milk and feed, and do the same about 5 o'clock in the evening. We find that if the cows are fed regularly for a little while they will very soon become gentle and contented. They will not look for anything during the day, and after they are through with their meal they are turned out of their stalls and put in a large run-way, and there they remain during the day. At a quarter to five they are let in. Each cow takes her place, and while eating her meal she is milked, and, being through, she is turned out into the run-way again, where she lies down and chews her cud, and has a jolly good time. In the evening the same thing is done. This run-way is in the basement. It is a comfortable place. It has water and salt and light, and it is by these means that we are able to produce milk and butter so cheaply. We do not let our cows work off the food energies with their muscular system, nor do we allow them to fill themselves with indigestible, innutritious food, but feed to each cow wholesome food at regular periods.

Prof. Smith: I want to tell Prof. Hacker, counting the silage at $2.50 a ton, oil meal $20 a ton, wheat bran $9.50 a ton, corn meal $11 a ton, and clover hay $8 a ton. our butter costs on an average 8.3 cents a year for the herd.

Prof. Hacker: At a rough estimate, I would consider that cheaper than ours.

Prof. Smith: No, sir, it is not; you have the honors on that.

Prof. Hacker: I am asked if I feed silage. We do, but the silage we are feeding at present is very fine fodder corn that has no ears whatever. We planted it on the 14th day of June; that is about the time we plant our first fodder corn. We find that the growth is very rapid and that it will contain a larger per cent. of protein than it would if we planted it early and the growth were slow.

Secretary Plumb: Before adjourning for dinner I desire to announce the scores for butter and cheese, and the awards of the premiums. Some prizes were not awarded, as there was no competition for them. The prize offered by the Association for the best exhibit of butter ready for delivery to consumer, showing method of preparation, is not yet awarded, but it is proposed to announce this later.

The following are the winners of the prizes:

SCORES OF ENTRIES OF BUTTER AND CHEESE.

PROF. T. L. HACKER, JUDGE.

CREAMERY TUB BUTTER.

	POINTS SCORED.
Spiceland Creamery	95¾
Wabash Creamery	94¾
Lewisville Creamery	94¾
Carlisle Creamery	94¾
Silas Holloway, North Manchester	94
H. F. Rotermund, Bemes, Ill	94
Fish & Colson, New Castle	93¾
Centreville Creamery	93½
Brunswick Creamery	93
Blue River Creamery, Knightstown	92½
Webster Creamery	92½
Farmersburg Creamery	92½

DAIRY BUTTER.

	POINTS SCORED.
Geo. S. Tappan, Liberty	94
Mrs. C. G. Bartlett, Lewisville	92¾
A. F. Ward, Thorntown	92½
D. J. Cope, Lewisville	92½
J. W. Marts, New Castle	92¼
O. P. Macy, Mooresville	92¼
J. H. Harvey, Carmel	92
Arthur Hoadley, Ockley	92
F. M. Crull, Lewisville	92
Caroline Edgerton, Spiceland	91
H. E. Taylor, Fort Wayne	91
C. B. Benjamin, LeRoy	91

CHEESE.

	POINTS SCORED.
Boyd & Drischel, Cambridge City	93
Lewisville Creamery	90½
P. G. Yoars & Son, Amboy	86
W. L. McCain, Hortonville	85
Jewell Creamery, Kokomo	80¼

PREMIUMS WON.

The following are the premiums won, and the names of prize winners and scores:

CREAMERY TUB BUTTER.

First Premium.—Twelve dollars for the best tub of butter, offered by the Association. The Spiceland Creamery, 95¾ points.

Second Premium.—Eight dollars for the second best tub of butter, offered by the Association. The Wabash Creamery, 94¾ points. The Lewisville and Carlisle Creameries also each scored 94¾ points, but the award was given to the Wabash Creamery for being in a superior package to the others.

A Solid Gold Medal, engraved with the winner's name, was offered by the Wells & Richardson Co., Elgin, Ill., to the butter-maker making the highest scoring butter, colored with their butter color. This was won by Herbert Newby, of Spiceland, who made the first-prize butter.

A Special Premium of Ten Dollars was offered by the DeLaval Separator Co., Chicago, Ill., to the butter-maker receiving the highest score on butter made exclusively from cream separated by a DeLaval machine, open to creamerymen and dairymen alike. This prize was won by O. J. Richardson, of the Lewisville Creamery, whose butter scored 94¾ points.

DAIRY BUTTER.

First Premium.—Six dollars for the best five pounds of dairy butter, offered by the Association. Geo. S. Tappan, Liberty, Ind., 94 points.

Second Premium.—Four dollars for the second best five pounds of dairy butter, offered by the Association. Mrs. C. G. Bartlett, Lewisville, 92¾ points.

A Special Premium of Five Dollars to the maker of the best dairy butter colored with Wells & Richardson's color, and offered by that firm, was won by Mr. Tappan.

A Special Premium of a Polar Creamer, valued at $20, offered by the Polar Creamery Co., Lafayette, Ind., to the one scoring highest on dairy butter, was also won by Mr. Tappan.

CHEESE.

First Premium.—Ten dollars for the best full cream cheese, offered by the Association. Boyd & Drischel, Cambridge City, 93 points.

Second Premium.—Five dollars for the second best full cream cheese, offered by the Association. Lewisville Creamery, score 90½ points.

The following premiums were also offered, but were not won by any of the exhibitors, the requirements not being met with:

Offered by the Association.—Best display of dairy butter, showing method of producer in wrapping, labeling and delivering, $5. Best exhibit of fancy cheese, $5.

Special Prize by Worcester Salt Co., New York.—A Gold Watch, valued at $25, to the tub of butter scoring highest, provided said butter is salted with Worcester salt.

Special Prize by Vermont Farm Machine Co., Bellows Falls, Vt.—For the best package of butter, not less than 20 pounds, made from cream separated by the Improved United States Separator, $10; for the second best, $5.

Special Prize by Genessee Salt Co., New York.—For the highest scoring butter, if salted with Genessee salt, $25.

For the best essay on butter-making, limited to 1,200 words, open to makers of dairy or creamery butter, the Association offered a premium of $10. This was won by Mrs. C. B. Benjamin, of LeRoy, Lake County.

A Special Prize of Ten Dollars, offered by the Champion Milk Cooler Co., of Cortland, N. Y., for the best essay on "The Aeration and Cooling of Milk," the essay not to exceed 1,500 words, and not to mention any special aerator or cooler, was won by Mr. J. H. Monrad, of Winnetka, Ill.

The thanks of the Association are due the aforesaid mentioned firms for their generous offers of premiums, thereby greatly adding to the importance of the exhibition and annual meeting.

Mr. Monrad: I wish to tender to this Association the $10 premium awarded me to be used toward paying off its $100 of debt. (Applause.) The gift was accepted and the Association gave Mr. Monrad a vote of thanks.

President Stubbs: I announce as the Nominating Committee, W. S. Commons, of Centreville; Edward Sudendorf, of Elgin, Ill.; John Harvey, of Carmel, Ind.; T. S. Nugen, of Lewisville, and H. C. Beckman, of Brunswick, Ind.

The convention here adjourned at 12 o'clock, noon, Thursday, December 30, 1897, until the afternoon of the same day, at 1 o'clock, at which the convention reconvened, and the following proceedings were had:

President Stubbs: We will now listen to the subject of the

MUNICIPAL CONTROL OF DAIRIES IN INDIANA.

BY DR. A. W. BITTING,

Veterinarian Purdue University and Indiana Agricultural Experiment Station.

I am fully aware that milk and dairy inspection are subjects not always popular with dairymen, as they are too often in the habit of thinking that such action upon the part of a city is an interference in private business and only works a hardship. This estimate of the value of inspection seems to be quite general in this State, and after having made a careful inquiry into the work as it is conducted in different places I am not much surprised. If, however, I can correct such opinion of proper inspection I shall have sufficient excuse for introducing the subject.

The right of a city or town to determine under what conditions any food may be sold within its corporate limits is not a newly acquired power. The right to prescribe what may and what may not be used as food is as old as society itself. Among the first laws given to the Israelites by Moses were those defining what animals might be used for food. The reasons for forbidding the use of some are not fully given, but are declared unclean. Whatever may have been the reasons at that time it is certain that every decade of history has had its laws forbidding the use of meat from diseased animals. These laws have always represented the knowledge regarding the transmission of disease at the time of their enactment. Within recent years our knowledge of the cause of disease has been increased and the restrictions are becoming correspondingly greater. It has not been many years since the use of milk from diseased animals was forbidden, and now the effort is being further extended to require the handling of meats and milk in such a manner as to prevent the possibility of becoming contaminated with disease germs. It is not the intent to introduce the subject of meat inspection in this address, but as it is the older, and is the parent of milk inspection, it has seemed well to refer to it.

The necessity for food inspection increases with the density of the population. Upon the farm, and in the smaller villages, foods are produced in excess of the wants, and little or no attempt is made to use anything unwholesome or to make adulterations. In the larger cities, foods. particularly those that are perishable, are difficult to obtain, command a relatively high price, and the stimulus to adulterate is great—too great to be withstood by all men. As a protection to the consumer a surveillance is placed over all. The honest producer shares in the benefits by the elimination of the objectionable article from the market, and from the increased demand that comes from knowing the article is what it purports to be. The large pork packers were among the first to fully appreciate the value of inspection. This is well illustrated by the common advertisement of a large ham, marked "U. S. Inspected," and you may be sure that that guarantee has sold Armour his thousands in preference to the product of the local butcher. A dairyman is occasionally found who takes advantage of the desires of customers, and has his herd tested, and sells a guaranteed milk. Milk is one of the most important foods, and unfortunately one of the most easily manipulated. It is skimmed, strippings are withheld, and it is watered and otherwise adulterated. It therefore follows that milk is one of the first foods to be inspected by cities. Every large city has its milk inspector. The population in Indiana is just beginning to reach the point where such inspection is being inaugurated.

The terms "milk and dairy inspection" are not used alike in all places. Milk inspection is the older term, and is applied to the inspection of milk regardless of the conditions under which it is produced. It has to do with the determination of fat, withholding of strippings, watering, and all forms of adulteration. This is the kind of inspection made by most of the cities. It has the effect of raising the standard of milk sold in a city, and protects the pocketbook of the consumer. Dairy inspection is the term applied to the work when it is diretced to the source of the milk supply, the herd, the sanitary conditions of the stables, the feed, water, and the people handling the milk. Its province is to see that the milk is produced and handled under proper conditions. It covers a broader and more important field than milk inspection, as it directly concerns the health of the people. If it is an injustice for a man to water his milk until it has only one and one-half per cent. of fat, and sell it in a market in competition with milk having four or four and a half per cent. of fat, it is a far greater injustice for a man to sell milk from diseased cows, fed upon sour starch feed, kept in dark, damp stables, and the milk contaminated in the handling, in competition with the man who has healthy cows, fed upon sweet feed, given pure water, kept in clean stables, with plenty of light and ventilation and the milk handled with all that care that is seen upon some of your model dairy farms. The different conditions under which milk is produced is well illustrated by the accounts given by two members of the station staff and myself after returning from trips in the State. One went to the northwest, one to the extreme southeast, and I to Terre Haute. The one returning from the southeast had to make a very early morning drive several miles through the country to meet a train. The morning was damp and foggy. When some distance from the station he remarked to his host that there was a bad odor in the atmosphere, that it smelled like a tannery. He was assured that there was no tannery near. After driving some distance farther the outline of something like hills began to appear through the dense fog. Coming nearer, the hills were found to be manure piles of years' (probably ten or twelve) accumulation from a large dairy. It was the source of all that vile odor. The yards were deep with mud, tramped by the scores of cows. Everything looked dirty and would forever set the stomach of any one except an experiment station official against the use of milk. The member returning from the northwest had seen some good and some bad dairies, and among the latter was one whose milk went into the same market in competition with the good. Upon entering the stable door a very bad odor greeted the nostrils, and after looking about for a few moments he espied pigs eating the carcass of a cow that had died of tuberculosis. From all appearances two other cattle in the herd would soon share the same fate. I had visited Terre Haute and seen the More Park dairy with its cows so clean that it could almost be said that they would not soil a handkerchief; the stables were whitewashed above and the floor covered with plaster. I had seen the bottles cleaned and sterilized, and the milk aerated and cooled, and tasted the finished product, of which there is none better. I also saw some fifteen other dairies, and a cleaner lot can not be found within our State.

The cases reported represent extreme types, but the difference between the best and the worst about every city is very great. Every customer has the means of testing his or her milk for the quantity of cream, but few have the opportunity to visit the premises upon which it is produced. What is needed is efficient dairy inspection, and more milk will be sold, but not at 4 cents per quart.

Last summer I addressed an inquiry to the secretaries of the boards of health of one hundred cities and towns in this State, relative to the dairy ordinance, the number of dairies supplying their city or town, the number of cows in the dairies and the milk and dairy inspection. The replies indicate that the whole matter is in an unsettled state. There is no uniformity in requirements or method. The health official in one of the largest cities in the State did not know whether there was an ordinance relative to dairies, knew nothing about the dairies, and made no inspection. This presents a striking contrast to the condition in another city a little lower down upon the Wabash. Here we have proper regulations and a qualified inspector with full knowledge of every dairy supplying the milk. I have visited the dairies in both cities and the conditions under which the milk is produced are as a whole as striking as the cases related a few moments ago. To date, Terre Haute, Indianapolis, Richmond, Fort Wayne, Evansville, Vincennes, Frankfort and Elkhart are the cities trying to better the dairy product by inspection. In some of the other cities an occasional sample of milk is taken and the city or county health officer visits the premises once a year.

We may expect some very unique milk and dairy ordinances. Each local board formulates its own rules and regulations. In some instances the members of the board will have little knowledge of the cow or her requirements; and in others the effort will be to so frame an ordinance as to admit of some favorite as inspector. Unless the inspection is administered by one competent to do the work, it will meet the opposition of dairymen. Milk and dairy inspection is not the proper work for policemen, constables, butchers and bakers any more than is the filling of a prescription the business of a lawyer. Here we have an illustration of the good that can come from having the ordinance recommended from some central board, as the State Board of Health. It would insure uniformity in requirements and method of execution.

The first step in dairy inspection is to secure cleanliness. That secured, all other things will follow. Clean stables, clean cows, clean buckets, clean milkers, will insure a wholesome product. To secure these must come light, and with light will come room and ventilation. Within the past few weeks I have made measurements of a number of barns to determine the cubic air-space for each cow. The range is from 180 to 850 cubic feet. In every case in which the space was less than 500 feet there was overcrowding and insufficient light and ventilation. In the majority of cases, when the space was more than 400 cubic feet, the conditions might have been greatly improved by knowing how to light and ventilate. It was not much of the desire not to do the proper thing, as in not knowing how. Here is one of the places where a competent inspector can do much service.

The science of bacteriology has been developed since many now engaged in dairying began. They cannot study it, and hundreds of those that are to follow will not have the opportunity. From it we learn the causes of changes in milk and the means of carrying disease. A competent inspector should be able to suggest and give such instruction to dairymen as will enable them to avoid many of the difficulties. I will venture the assertion that seven-eighths of the dairymen in this State deliver milk twice a day, winter and summer. If all the labor, expense of horse flesh, wear and tear upon vehicles could be cut off, of making one delivery per day, the saving would be very great. If the milk is handled properly this may be done, and the inspector should be able to give some assistance in its accomplishment.

This paper would not be complete without referring to the tuberculin test for tuberculosis. Tuberculosis is a disease of cattle the same as of people, and may be transmitted through the milk to the consumer. The disease can only be diagnosed with certainty in the early stage, and sometimes in the later stage, by means of tuberculin. This agent indicates the presence of the disease, no matter how mild or how far advanced, and it must be borne in mind that the external appearance of the animal can not be taken as indicative of how badly an animal is diseased. When an animal reacts, we must treat her as dangerous, although upon post-mortem it may be found that the lesions may be very small. Complete inspection will include the tuberculin test. Notwithstanding all the dangers that may come from tuberculosis, I can not recommend this as being the only thing in dairy inspection. For a city to begin dairy inspection by starting with the tuberculin test is to begin at the wrong end. Let it begin with cleanliness first, and let the tuberculin test follow, for having once established good sanitary conditions, it will be comparatively easy to stamp out the disease.

I believe in encouraging the use of tuberculin by all proper methods. It will come to be used in all dairies in course of time, but more good can be accomplished in the beginning by testing upon voluntary request than through compulsion. The recent action of the Marion County Dairymen's Association, in requesting the test for their herds; shows they are prepared for it, and ready to stand the consequences. Let us hope their trade will prosper as their herds are pronounced free from disease. From Indianapolis the movement is spreading to other cities. I expect it will receive some backsets before it makes the rounds, as some of the boards of health will pick it up, make a flurry for a couple of weeks, then drop it for something else, as examination of coffee and pepper. To do good, effectual work, dairy inspection must be constant, consistent, and alike to all, otherwise it will only be brought into disrepute.

As the dairymen are greatly interested in this subject, they should unite, and as new ordinances are introduced into city councils upon the matter, insist that they be modeled after the best, and that the work be properly done.

President Stubbs: Having concluded his address, Dr. Bitting finds it necessary to go to the train. Unless some one desires to discuss this subject, we will now take up the next paper on the program, which is

SOME FACTS IN THE HISTORY OF A SUCCESSFUL CREAMERY.

BY W. S. COMMONS, CENTREVILLE.

Since facts are stern realities, I shall endeavor to allude to nothing that has not come under my personal observation, while acting in the capacity of secretary of a fairly successful creamery. As I proceed I shall enumerate a few of the obstacles which we met with in our struggle for existence, and try to explain briefly how they were overcome, beginning at a time when we were at the height of our exuberance over our anticipated success as a wealth-producing corporation. To this jubilant condition of mind we were led up to by the one-time conspicuous and over-zealous creamery advocate, "The Oily-Tongued Chicago Creamery Promoter," whose particular business it was to elaborate only on the bright side of the creamery question. To the uninitiated he seemed to be a veritable philanthropist, traveling about with the sole purpose of doing good, by enlightening us on the question of dairying in all its various phases, leading up to and, of course, not omitting the creamery adjunct. In his unbounded generosity he settled our junketing expenses to favored dairy spots, and sought to purchase our neighborhood influence with blocks of our corporation stock. The echo of his footsteps had scarcely died away, however, when we found ourselves in possession of the merest nucleus of an enterprise, with which we had not the slightest experience. Nor had we any knowledge to speak of, save that of a questionable kind received at the hands of our generous friend, the aforesaid promoter. We found, further, that we had paid in cash, or its equivalent, $4,000 for an actual valuation of perhaps one-half that figure. We found also that the alleged expert furnished us, and upon whose extraordinary ability as butter-maker and manager we were led to believe we might rely, to launch our frail craft, compared favorably in the required qualifications with the other adjuncts of our youthful enterprise. But we did not nurse our regrets. Our Board of Directors quickly saw that in heroic effort lay possible success; while inaction and the fostering of any feeling akin to discontent or suspicion meant absolute failure, in which event the responsibility would fall where it largely should, on the shoulders of the executive board. Happily our board was composed largely of individuals of broad ideas, unselfish and unprejudiced views, and we set promptly about to borrow and absorb from the standard dairy and creamery authority of the country, the necessary information and inspiration, if you please, to operate our misfit, inappropriate and short-lived machinery, in such a manner as to permit the manufacture of a prime article of butter. The supply of milk now became a factor in our existence, and, thanks to a few determined stockholders, we were furnished with an amount barely adequate to the nourishment of our infantile plant, leaving out for a time the then less important matter of profitable returns to the dairy.

This period in our existence was a critical one, as I believe it must be with all co-operative concerns. There seemed to be a sort of contagion of suspicion and discontent, in spite of our efforts, raging among our stockholders and patrons, and it received additional impetus at the hands of the ever-present citizen whose principal characteristic it is to always anticipate disaster, and hopes to be in position to proclaim to the unwary, "I told you so." At this trying moment it became urgent upon the management to adopt some seemingly stringent but practical business methods, and keeping from the public, including the corporate body, many facts that were really discouraging, and assuming the somewhat hazardous risk of placing our individual credit behind the concern. Thus we were provided, in a sort of primitive way, with the financial ability to bridge over the first chasm of despondency that came of disappointment.

Then followed closely the disappointments that always attend, and should attend, the adoption of the pooling system of buying milk. This, however, was of short duration, as the advanced ideas which we had determined to adopt led us swiftly up to the adoption of the gratuitous, grand and practical invention of Dr. Babcock, namely the chemical test, to determine the real value of each patron's milk. This in the main was satisfactory, and especially so to that portion of our patronage whose milk product was most valuable to the creamery. But it required much time, trouble and patience to reconcile the rather crude ideas of a great many of our patrons to the belief that the Babcock theory was correct in practice, nor am I sure at this time that we have been able to allay all suspicion against it being the only true and equitable way of estimating butter fat values. The latter sentiment, however, prevails to only a limited degree, if at all, and does not, in my judgment, detract one iota from the fairness of the system, but only goes to show the lack of information prevailing among the farming masses on the subject of "cowology."

The next annoyance to obstruct our progress was one common to co-operative business, and characteristic of ever suspicious human nature. I refer to the disposition of a few stockholders and patrons, who should have felt a kindly interest in their community welfare, if not their own, to withhold their patronage, and even kindly comments, until such a time as they could see our creamery permanently established and on a paying basis.

Imagine, if you please, this class of dairymen impressing, by actual demonstration upon the brute instincts of their cows, the necessity of their producing butter fat value received in the pail, ere they could expect the food necessary to sustain life, and you have my estimate of the business caliber of those individuals.

Those of us who have been actively identified with the work of building up new creameries will no doubt agree with me that we have this class of individuals to deal with in most new creamery districts, to a greater or less extent, and if the influence should prevail to a greater extent, the effect is usually disastrous, unless the tide of intelligence and prosperity should quickly overtake the enterprise. Then, on the same line, who of my brother managers has not had the overinquisitive individual to contend with, in the early period of our creamery's existence—he who is determined to have us admit for public information and distorted publication, that our venture was destined to be a failure, and in whose presence we are compelled to maintain silence, even at the sacrifice of truth?

Thanks to the wisdom of our Board during our early career, the mandate was issued, "That, inasmuch as the wisdom of the body of our stockholders has led to our selection as directors, we shall endeavor to manage the company's affairs on the basis that everybody's business is nobody's business, and that 'thus far and no farther' than the members of this executive board shall any unfavorable intelligence reach." And upon this foundation have we builded.

Now, we who have been over the course can readily see wherein we have erred, and how greatly we might have improved and economized in our manner of organization and general system of management. But let us console ourselves with the knowledge that it were better that we have a well established and profitable creamery business that some of us now enjoy, at 100 per cent. above par value, than not to have had it at all. This splendid agricultural State of ours is dotted all over with idle creameries, representing the loss of thousands upon thousands of dollars. They are veritable monuments, not so much to the perversion and deception of our abused friend, the creamery promoter, as to the lack of unanimity of action and determination on the part of those financially interested, to take the "bull by the horns," as it were, bury personal prejudices, adopt simple business methods, and establish and maintain a high standard of credit. Other things being equal, the owners of 80 per cent. of Indiana's defunct creameries might to-day be enjoying a revenue therefrom instead of entertaining, on account of their disappointments, a feeling of general condemnation against everything connected with the creamery interests.

After a creamery is fairly well established, its line of management should not be very different from that of any other class of manufacture. But if co-operative, or a stock company, it should have one authorized head, he to serve under the supervision of a board of directors, but given the opportunity to use his own discretion in all matters of detail. Improved appliances and competent labor should be employed. This being a day of small things, the wastes of the factory should be closely watched. The butter-maker must not only feel that he is confining the butter-fat loss at separator and churn down to a minimum each day, but it is his place to know, by actual test, that such is the case. The sanitary arrangements should be as nearly perfect as surrounding conditions will permit. Nooks and crevices where bad odors may lurk should have no place in a modern creamery. A rigid inspection of milk and the prompt rejection of all not in good condition, regardless of the owner's favor in the matter, should be enforced. With the above requisites a high standard of perfection in the manufactured article can be maintained. and a desirable market easily procured therefor. The commercial credit of the concern being maintained on an equally high basis, I see no good reason why a creamery, so situated, should not merit and receive an extensive patronage. And I am quite sure if the practical argument of profitable financial return will not draw the farmer's attention to an increased production of milk, no amount of bulldozing, or attempt to force him to keep a specified number of cows, will bring the expected results.

There are a few things along this line that are problems to me, and are very much in the way of our reaching a volume of business of very great magnitude. For instance, few creameries in Indiana reach a daily average of more than 5,000 pounds of milk, furnished perhaps by eighty or more patrons, or an average, say, of 60 pounds per patron. Now, the average is so low per individual that it would seem impossible for a large per cent. of them to figure a profit in hauling to the creamery, notwithstanding they would doubtless find less cash profit in churning at home. Two important elements seem to be in the way of finding a remedy. One is the too prevalent dislike of the menfolks to milk cows, or assume the necessary responsibility, knowledge, and ofttimes industry, required to make the dairy a really paying investment. The other, a similar dislike for hauling milk to the factory. When we are able to remedy the first evil, we shall have solved the second problem. We never hear a complaint from a patron whose daily product of milk is above, say, one hundred and fifty pounds. It is, therefore, a matter of surprise, that some of us will continue from year to year to draw to the factory, daily, twenty-five to fifty pounds of milk, when shoeing and tire-cutting must about absorb all the earnings.

But, on the whole, the dairy interests of eastern Indiana have been greatly enlarged by the establishment of a few good creameries, and our daily experience is convincing us that there is a steady tendency of the consumers of dairy products toward the use of creamery goods, as against those of the farm dairy, and the past year has demonstrated that our ability to manufacture has not been equal to the demand for either butter or cheese, and I see nothing in the future that is likely to retard the growth of this demand. In view of this fact I am disposed to criticize the short vision of our co-operative concerns for refusing to reach out and absorb more producing territory, as an individual ownership concern would most naturally do, by the erection of an occasional skim station, cultivating an increased interest in dairying and at the same time anticipating the growing demand for the manufactured article.

Now, in conclusion, and with pardonable pride, we Wayne County people of Centreville boast of having approached very nearly the point of having a model creamery in all that pertains to the facilities for turning out a high grade of goods, and with all due respect to the "cleanest factory in the State," we cordially invite your critical inspection of our sanitary condition.

President Stubbs: Mr. Gardner, of Wabash, had intended being here to read his paper, but circumstances have unexpectedly prevented. He has sent his address to the Secretary, and I will request Mr. Woods to read it to the Association. The subject is

HOW CAN OUR CREAMERY INTERESTS BE PROMOTED?

BY W. G. GARDNER, WABASH.

This question, I think, we shall find of such magnitude that it will be impossible to settle it satisfactorily to all concerned, at one or even many sessions of this convention. While there are those who are friendly to the creamery system of manufacturing the dairy product of the farmer, there are also those who view the system with a certain degree of suspicion, by reason of the many failures attending the attempt to introduce the same. Therein lies the main barrier to the general adoption of this method of handling the products of the dairy. In attempting to introduce any new article of machinery or mode of handling the different products of the farm, we must first demonstrate beyond doubt that the new system of operation will be a success, otherwise all attempts to promote the new enterprise will be a partial failure at least in the beginning.

The creamery system is no exception to the rule. It matters not how much the system may be praised by its most ardent friends, nor how much argument may be produced in its favor, we find as in every other new enterprise—for it must be termed a comparatively new enterprise in our own State—a vast amount of opposition that must be met and overcome, and this opposition can not be overcome by the simple assertion that the creamery system is the only correct method of handling dairy products, and therefore must be adopted in all sections of the country. But it must be demonstrated in such a way and by such a manner as will be convincing and conclusive evidence of the advantages of the system.

It is time wasted trying to replace methods already in operation and giving reasonably good results to the operator. With new, untried and doubtful methods, they must first be tried and proven to be better than the old method, at least, before we can hope for any degree of success in their general adoption.

It would further appear that the subject had been discussed on so many occasions and by so many able advocates of the system that it would be well-nigh exhausted and worn threadbare, but being called upon to again present the subject, we will be compelled to use some of the same old arguments and bring to view some of the same old illustrations to supply our needed argument in defense of this system of manufacturing and disposing of dairy products. There is no question as regards the advantages of concentration of labor as a means of economy. This applies with equal force to the manufacturer of dairy products and to the disposition of other farm products.

Following out this line of thought brings us back to the question, "How can our creamery interests be promoted?" And in the consideration of this question we are to confine ourselves for the most part to the State of Indiana, and while we may be forced to use some examples borrowed from our neighbors in other States, we shall endeavor to use only those that will apply with equal force in Indiana, where the majority of those present are personally interested, and in trying to present a few thoughts on how their interests may be promoted, will say a few words on how they may be hindered.

The creamery interests of this country, like most manufacturing interests, are very closely allied to the farming interests, and more especially to the dairy branch of farming. It will therefore be very essential and very necessary before completing the creamery to find the position of the farmer, or, in other words, to find if we can get the indorsement of the farmers on this question. as they are the class to be benefited most by it. And trying to promote interests without regard to some source of supply of material to run the business would be almost as barren of the desired results as would be trying to promote the interests of this Association without some definite purpose of view.

Then, as the object of the creamery is to supply the necessary market for the products of the dairy, it must be proven a necessity or at least an advantage over other methods of producing such products. At this point I wish to call your attention to a part of the twelfth and thirteenth annual reports of the Bureau of Animal Industry. In these, Henry E. Alvord, Chief of the Dairy Division, says:

"The establishment of the creamery as a central place and improved plan for making butter for a number of farms is as natural a development and as distinctly a forward movement as the substitution of the grist mill and woolen factory for the old methods of grinding, spinning and weaving upon the farm. Regarding milk or cream as raw farm products, like grain and wool, the same arguments apply in favor of manipulating or manufacturing them in one place instead of several or many different places. Whether the change is made by reason of co-operative effort among the producers or as a business enterprise introduced by one or more persons, the probabilities are that the result will be economy in manufacture and improvement in the average quality of the product. There may be poor grist mills or too many of them, and unsuccessful factories, but these are not sufficient arguments to cause a return to farm grinding or the home loom. The operation of the creamery, like the mill, is manufacturing and not farming. All such establishments must be judiciously located and properly managed on business principles. They are subject, like all business ventures, to ups and downs, periods of prosperity and depression, and those who supply the raw material will find the prices received to vary accordingly."

The hand sickle for reaping does not reappear with the low price of grain, neither a return to farm-grinding, and the same is true of the old-style churn in well developed dairy districts. There are cases where farming is done on so large a scale and where the surroundings are so complete and so favorable for the manufacture of the dairy products that no amount of argument is necessary. There are some smaller farms so well situated and provided with modern improvements for butter-making that we would not advise a change to the creamery system. Especially where exists a love for butter-making, but generally the creamery system in a community is a benefit to every one making butter, whether making good butter or bad, and especially to those making poor butter or bad butter, for by this system the poor butter is done away with almost entirely, and should the quality not be above the best of creamery-made butter, the price is increased by reason of the quantity and uniformity of the product. Furthermore, the cost of production is lessened, which adds to the profits, or is equivalent to increasing the price of the product.

The particulars in hundreds of cases might be given in which a creamery has been substituted for farm butter-making in a stated community with these distinct and satisfactory results:

1. The quality of the whole factory product is equal to the best of the single dairies of the same community.
2. A greater quantity of butter produced from the same cows.
3. The average selling price and the net return per pound of butter considerably increased.

4. The gains sufficient to cover the whole cost of running the creamery, thus causing

5. The cash income to the farmers from a given number of cows as much as by the old method, and often more, while at the same time all the labor and trouble and expense of making and marketing the butter is removed from the farm and the household.

6. Relief from the labor of caring for milk and cream usually results in adding to the number of cows and the effects of friendly rivalry between patrons of the creamery, with frequent money measure of the butter capacity of the cows tends to a constant improvement in the quality of the latter and in consequent profit.

A single example is as good as many. In the year 1884 a creamery was located in a certain town not especially noted for good butter. It began with seventeen patrons owning 100 cows, and the daily product was 79 pounds. In 1893 it had increased to 116 patrons, owning 1,000 cows, and its daily product was about 900 pounds. The product has sold at the highest market price, and the cow owners have received a greater net income per cow than ever before experienced. Nothing would induce these people to return to farm dairying, and in addition there has been general improvement in their farms and farm buildings.

The creamery or butter factory is an institution of American origin. The butter factory followed the cheese factory and was a natural development. Cheese factories have been in operation in the State of New York and elsewhere for several years. The first creameries were established as follows: New York, 1864; Illinois, 1857; Iowa, 1871; Massachusetts, 1880, and as shown by statistics, the growth of this form of dairying in history has been very rapid since that time, and also very satisfactory to the patrons of the system.

A few words in connection with the markets may be of interest. They are taken from the advance sheets of the report of the Secretary of Agriculture. He says:

"Early in the year it became apparent that a considerable surplus of butter of the highest grades would appear in our domestic markets. This had never before occurred, and it was plain that if such conditions prevailed for any length of time, the price of fine butter would decline, and, should this happen with the best quality, values would be depressed through all grades. Before midsummer the best of creamery butter was offered in almost unlimited quantities in our largest markets for fourteen and fifteen cents a pound, and no material change occurred for several weeks. I therefore decided to make a series of experimental exports of fine creamery butter for the purpose of promoting an incrase of foreign demand for this article, and in order to get full information of facts and conditions attending such exports than was otherwise obtainable. The experiment has proven of vast importance and shows that we have only to produce a first-class article to command our share of foreign trade.

"The export of butter from this country is nothing new. It began as early as the year 1847 and exceeded 1,000,000 pounds annually a hundred years ago. Then it increased to 35,000,000 in 1863, and dropped in 1870, and rose to almost 40,000,000 pounds in 1880. Since that time the quantity exported has been as low as 5,000,000 pounds, in 1894, and as high as 31,000,000 pounds for the fiscal year ending June 30, 1897. Since May 1, 1897, the exports from New York have been about 12 per cent. greater than for the same month in 1896. I simply refer to these figures to show that while there may be a temporary surplus of butter, that is somewhat discouraging to dairymen, by the proper use of means at hand, there is also a wonderful foreign demand for first-class American dairy products. There should be no lack of interest in fostering the dairy branch of farming, with no greater obstacles to overcome than an occasional depression in prices, for the fact is that we have no one to blame more than ourselves for the present conditions. A dishonest effort to palm off inferior products has brought about this state of affairs at present existing, and we have the remedy if we are ready to use it. Manufacture honest goods and sell them on their merits as such, be ready to lend assistance in correcting some of the wrongs that are constantly presenting themselves to the detriment of our home and foreign markets. Such frauds for instance as the unlawful manufacture and sale of butterine, oleomargarine, etc., frauds are coming under our observation daily and we wonder at the low prices of our dairy products; we wonder and continue to appear surprised and allow appeals for aid and assistance to pass unheeded, so far as any substantial help is concerned in the way of money donations to prosecute these frauds.

"Just at this time there is a case in the city of Philadelphia demanding the most stringent measures. Yet the parties needing prosecution for destroying the stamps on hundreds of packages of oleomargarine with the avowed intention of selling the stuff for creamery butter, are defying the laws, for the simple reason that they have escaped punishment for similar offenses in the past, and further have so little regard for law as to offer the revenue officers $7,000 in settlement for these violations. These offers are made on the same grounds that they settled similar cases for the same parties before, for Joseph Watkins & Co., and others of that stripe."

This line of thought may appear to be entirely foreign to the subject in question, but for one moment view the conditions of the dairy interests; were we rid of such frauds and the markets of our country free from such adulterations in food products! But substitutes and imitations and adulterations have been the curse of the country for years, and we must be made to realize these facts in dairy matters as well as in other things. Rid the country of frauds, adulterations and imitations and you have the problem, market and prices, virtually solved, and by so doing you also have the problem of the creamery, for the dairy product sold as well, the conditions must be such that the creamery will return a profit to the purchaser. When that is assured the factory will be on a sure foundation, by reason of having ample material to operate successfully. Then in promoting the creamery interests, the following suggestions will be a safeguard. A location among a class of farmers who are ready and willing to assist by furnishing raw material, who are ready to so co-operate that they may build and equip a plant of sufficient capacity to meet their needs, who are ready to employ intelligent help in manufacturing the products of their farms, or on the other hand, if not desiring to take a personal interest in the factory, to encourage some one in whom you have perfect confidence to take the sole ownership of the plant and stand firmly and faithfully by them with your substantial aid. By all means leave the professional creamery promoter entirely out of all your calculations. He has had his day with the people of this country and should be given a place along with other ancient articles such as the sickle, spinning-wheel and the old-style churn. Replace these old-time methods with a well-equipped separator or gathered cream system. We shall not attempt to advise which of these methods would best suit a community until we have studied the conditions, for while there are communities thickly settled in which the separator or whole-milk system would be preferable, there are other localities that could better utilize the gathered-cream plan; but in promoting the creamery interests by either system, dairy literature must be constantly urged upon the farmers, thereby improving the dairyman as well as the herds. The State of Indiana has long been noted for its progress in all enterprises pertaining to the advancement of her citizens, and, as the question now stands, is of deep interest to the farming class, we have faith to believe that progress in dairy matters, and especially that branch which is of most importance to the greatest number (dairying), will be no exception to the rule. When we are once awakened to our needs we will begin to look about us for means to supply those needs, and as better methods are being demanded for caring for the dairy products of vast numbers of farmers in this State, we should give this subject more earnest attention.

President Stubbs: The next and last subject on the program is a paper on

A SURVEY OF THE CREAMERY SITUATION IN INDIANA.

BY C. S. PLUMB, LAFAYETTE.

Up to the time of this report no authentic and fairly complete record of the creamery interests of Indiana has ever been published. The great creamery boom which began in Indiana about 1890-91, commenced just too late to be included in the United States Census Report for 1890. Since that date the only published information on this subject has been of an incidental character in the agricultural or dairy journals. Two years ago an attempt was made by a committee appointed by the State Dairy Association to secure statistics concerning our creamery interests, but this committee secured but little information of a comprehensive character.

Early in the present year (1897) the writer, realizing that much money had been invested in creameries in this State, and that much of this had been completely lost, began an investigation of the subject in the capacity of an official of the State Agricultural Experiment Station. He believed that the agricultural interests of Indiana would be served and helped if some authentic information could be presented to the people concerning this industry. With this purpose in view, a circular letter and a series of questions on separate sheets were sent to every creamery in the State whose address could be secured. The result of this investigation is as follows:

Number of Creameries.—One traveling man of a dairy supply house has stated in my presence that he knew of at least 285 creameries in Indiana. The circular letter was sent to over 200 addresses secured in various ways, some of which it seemed were entirely worthless ones. In each circular letter the request was made that the recipient send the writer the names of any creameries he knew of in the county in which he was located, and by this means the addresses of many creameries were secured.

At the present time the writer has a list of 57 creameries that were in operation in the State in 1896, and of 47 that were once, but now no longer, in existence, a total of 104. This list is not complete, however, as there are some existing as well as defunct creameries yet to be reported on, from which it seems almost impossible to secure recognition of a letter enclosing return postage.

When the Creameries were Established.—One creamery was established at Indianapolis in 1878, and is still running, although at the present time ice-cream making is the leading feature of the business, butter being made from the surplus cream. The same year a cheese factory was established at Orchard Grove, Lake County, which was discontinued after eleven years' operating. Since this date creameries have been established in this State as follows:

1880	1	1888	2	1893	6
1882	2	1889	5	1894	4
1884	1	1890	10	1895	3
1885	3	1891	24	1896	9
1887	6	1892	18		

Of the 104 creameries reported on, all but seven gave the date of establishment. Some of the dates may be incorrect, but generally speaking they are probably right.

It is interesting to note that the years 1891 and 1892 were those in which the creamery industry was most boomed in our State, forty-two creameries being built during those years. Of the creameries erected reported on, fifty were built and equipped by Davis & Rankin, a firm now happily defunct, like many of its creameries, which unquestionably did great damage to the dairy interests of Indiana. The other creameries were erected by numerous firms, no one having built very many. Some were built and equipped through purchases from different supply houses.

Defunct Creameries.—Forty-seven creameries, for one reason and another, have gone out of existence in this State. As a general thing, they were not operated over a year or so, and eight of them at least only a few weeks or months. In forty-five of these creameries was invested $195,050, an average of $4,300 each.

Various causes are attributed to the failure of these establishments. of which mismanagement and lack of milk are two principal ones. Either reason is sufficient in itself. The writer knows of one instance where an agent of Davis & Rankin secured enough stockholders to establish a creamery at a cost of almost $5,000 in a district where only corn, hogs and beef cattle prevailed. The creamery was run only a few weeks, when. as there was no milk in the neighborhood, as a matter of saving to the stockholders, it was closed up. At this period of development not enough milk was in sight to keep the machinery in use. The building—the last I knew—was used as a laundry, as are some others in the State.

Creameries in Operation.—During 1896, according to reports rendered. 57 creameries were in operation in Indiana. A number of these have ceased operation in 1897, so that perhaps 50 of the 57 are now doing business.

The original cost of these creameries amounts to $211,915.

Thirty-nine of these creameries received during 1896, 41,227,888 pounds of milk, and if we estimate this milk to have an average value of 70 cents a hundred, it will be worth $288,595.22. Thirty-three of the 57 creameries report having made 1,963,725 pounds of butter, which at an average price of 13 cents a pound would be worth $255,284.25. Only seven creameries report making cheese, of which six give the amount made in 1896 equal to a total of 264,305 pounds. One of these factories made 110,176 pounds of full-cream cheese.

Thirty-seven of the 57 creameries give the value of their sales for 1896. The total amount of sales is $380,652.50. One creamery sold $30,000 worth of butter during the year, another $29,300, another $24,178.55, and another $24,000. Twenty-two of the creameries report sales of less than $10,000 each for the year.

Nearly all the creameries were originally stock companies, or co-operative organizations. Many of these are still continuing as such, while many others have finally gotten into private hands. Of the 57 reported in operation in 1896, 29 are owned by individuals.

The number of patrons supplying the creameries with milk, as might be expected, varies widely. With two exceptions, where two in one and three in the other persons supply the milk, the number of patrons ranges from 15 to 300. In two instances as high as 300 patrons are given, but each of these creameries maintain a gathered-cream system. Of the separator creameries, that at Centreville is reported as having 170 patrons, the largest number of any one.

Twelve of 55 of these creameries purchase milk by the hundred pounds, while the balance report buying on the test basis, some specifying by the Babcock test.

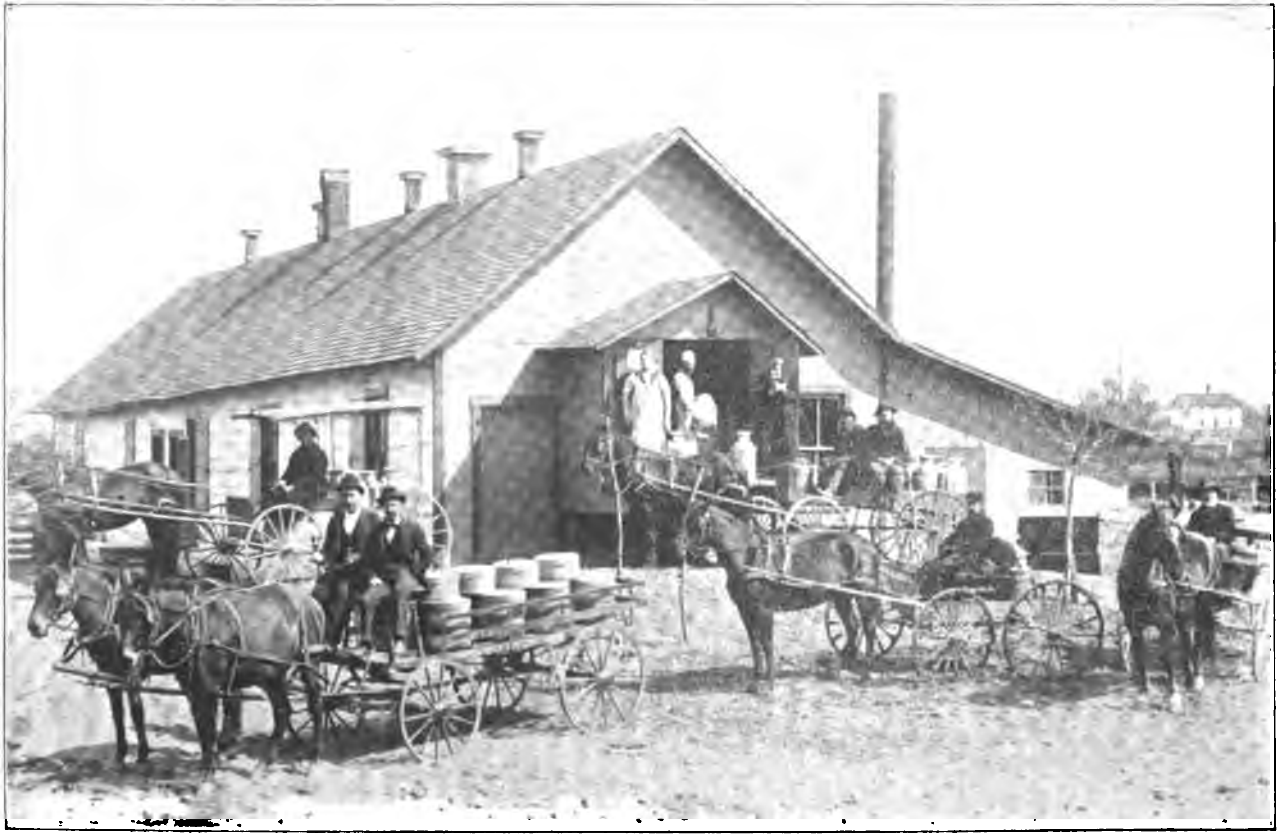
Only 9 of 45 creameries report having been insolvent at any time, the other 36 specifying "never insolvent," while 11 made no answer to the question.

The question was asked: "Are the dairy interests in the county growing?" In reply to this, 10 say "No," 9 say "Doubtful," "not very much," "slowly," not losing ground," etc., while 33 say "yes," which, in the face of the hard year of 1896, may be considered a most encouraging per cent. of favorable replies.

In reply to the question, "When did the creamery pay a dividend last?" fourteen reported dividends paid between 1895 and January or February, 1897, and all of them but one did so in 1896 or 1897. Thirteen reported "never" or "none," while 25 gave no answer to this question. In view of the fact that 9 of these operating creameries were established in 1896, it is apparent that these factories could hardly be expected to declare dividends before being operated twelve months. So that the number of replies to this question are no doubt affected by this phase of the subject.

Information was also sought as to the markets to which these creameries shipped their products. Of 54 reporting this, 16 ship to Chicago, 10 to Indianapolis, 12 to New York, 4 to Cincinnati, 2 to Philadelphia, while nearly all of them sell more or less to the local markets, and some sell to the larger Indiana towns and cities, as Ft. Wayne, South Bend, Richmond, Lafayette, New Albany, Muncie, Knightstown, Huntington, etc. Some creameries ship to several large cities, as well as supply local trade. Of course the season of year also plays a considerable part in the market question. Undoubtedly, however, Chicago, New York and Indianapolis are the favorite markets.

Distribution of Creameries.—An examination of a map of the State, with the distribution of the creameries thereon, shows a very large proportion of them located in the northern portion, with Marion County for a southern boundary line. Lake and Henry counties are the leading ones, the former showing seven and the latter five creameries, with three defunct ones in Lake County. Laporte and Wayne counties report four working creameries in each, although one of those of Wayne is a skimming station. Marshall and Miami counties each report three creameries



THE COLUMBIA CHEESE FACTORY, CAMBRIDGE CITY, INDIANA.

in operation, while Sullivan, Porter and Allen each report two working ones. Of 19 creameries organized in southern Indiana, taking the north line of Bartholomew County as the northern boundary, 12 are now defunct—in fact, 13—as one of the remaining 7 closed its doors in 1897. Notwithstanding the proximity to Cincinnati and Louisville, I can learn of no creamery now in operation along the Ohio River on Indiana soil.

The general report from southern Indiana is a depressing one as based on the growth of dairying, while most encouraging ones come from the northern part of the State, where a number of dividend-paying creameries now exist. Lake County, with its nearness to Chicago, seems to be our leading and most successful creamery county.

What of the Future?—The past seven years has seen great damage done to dairy interests in Indiana, through thousands of persons being inveigled into placing money in creameries, under conditions which any well-posted man in the business would say were most unfavorable to success. It is unfortunate that the country should have been invaded by these so-called creamery sharks. It is unfortunate that the people of the State should have seen fit to have spent their money ignorantly and without a knowledge of correct principles. The investors now curse the industry, which in itself is all right, while they never berate their own stupidity in investing in a business of which they had no adequate knowledge. They refuse to see that they in one sense were partners in a scheme in which they were expected to furnish the money and the other fellow the experience at the start, with the other fellow to have the money and the stockholders the experience at the end.

In spite of the disfavor with which dairying is looked on in some of our counties, and by many of our farmers, the writer believes that the future promises a good growth of the industry in our State. Thirty-three of 57 creameries report the dairy interests of the counties they are located in as growing. Is not that a favorable sign, especially in a year when our butter brought the lowest price in its history? It seems to me that it is.

The people of Indiana have large interests in wheat and corn, and beef cattle and swine, and many do not take kindly to milking cows. But so sure as dairy farming follows in the wake of soil exhaustion, so sure will the fertility of Indiana now being shipped without her borders in the cereals be returned again in not far distant years through the medium of the dairy cow and the dairy industry.

TABLE 1. INDIANA CREAMERY STATISTICS, JANUARY 1, 1897.

No.	Name of Creamery.	Owned by Individual or Stock Company.	Name of Owner, Secretary or Manager.	Butter or Cheese Maker.	Milk Bought by 100 or Test.	Year Established.	Built by	Original Cost.	No. Patrons.
1	Arcadia Creamery	I.		W. T. S. Bray	T.	1896	Davis & Rankin	$4,000 00	65
2	Cottage Grove Creamery	I.	Schlosser Bros.	C. E. Hulderman	T.	1884	Davis & Rankin	1,500 00	2
3	Brunswick Creamery Company	S.	J. N. Beckman, S.	Harry Matthews	T.	1892	Vermont F.M.Co.	2,360 00	40
4	Columbia Cheese Factory	I.	G. W. Drischel, S.	Geo. Usher	T.	1892		1,800 00	74
5	Carlisle Creamery Company	S.		W. S. Hastings	T.	1892	Davis & Rankin	4,500 00	100
6	Carthage Butter and Cheese Co	I.	Owen S. Henley	J. R. Carfield John W. Rohe	100	1891	Davis & Rankin	4,200 00	40–50
7	Centreville Creamery Company	S.	W. Commons, S	L. B. Harris	T.	1892	Davis & Rankin	4,000 00	170
8	West Creek Creamery	S.	M. S. Klein, Mgr.	John Kohle	T.	1896	Burnap & Bur'p	3,000 00	36
9	Cumberland Capital Creamery Co	S.	Ed. Bouge, Mgr	Fred Hilkene	100	1891	Davis & Rankin	5,700 00	90
10	Deedsville Creamery Company	S.	R. A. Robins, S	L. M. Quick	T.	1897		1,100 00	98
11	Dyer Creamery Company	I.	A.W. Stommel, S.	John Breuscher	T.	1893	Various firms	3,250 00	38-40
12	Fairland Creamery	S.	Robt. McBeth	Robt. McBeth	T.	1890	Davis & Rankin	4,500 00	40
13	Farmersburg Co-operative Creamery	S.	W.S. Baldridge S.	Reed Johnson	T.	1896	Brent & Davis	5,000 00	90
14	Francesville Creamery Company	S.	W. D. Busch, S.	Charles Clark	100	1891	D. H. Roe & Co	5,800 00	40
15	Freelandville Enterprise	I.		C. F. Volle	100	1890	Fargo		25
16	Greenfield Creamery	S.	J.H. Comstock, M.	John Mingle	T.	1896	Davis & Rankin	5,600 00	50
17	Hagerstown Creamery Company	I.	L. S. Dilling, M	T. A. Shafer	T.	1891	Davis & Rankin	5,200 00	100
18	Oak Grove Creamery	S.	Schlosser Bros.	Mr. Lesmick	T.	1885	Davis & Rankin	2,500 00	
19	Hebron Butter and Cheese Company	S.	B. F. Nichols, S	B. F. Nichols	T.	1891	Davis & Rankin	5,600 00	60
20	Huntertown Co-op. Creamery Co	I.	J. H. McCarty, S.	S. F. Gardinier	T.	1892	Davis & Rankin	4,500 00	40–60
21	Huntingburg Cheese Factory	S.	E. Klausmeier	Louis Klausmeier	T.	1889	Blue Grass C. Co	3,300 00	15
22	Hurlburt Co-operative Creamery Co	I.	S. H. Adams, S	S. H. Adams	T.	1895	Cream'y Pkg. Co.	1,805 00	20 40
23	Furnas's Creamery	S.	R. W. Furnas	Edward Milhous	C.	1878	Various firms	500 00	32
24	State Line Creamery Company	I.	Joseph Berg, M	John C. Wilkening		1892	Roe & Co.	3,500 00	50
25	Blue River Creamery	I.	White & Maple	H. R. Williams	T.	1896	Burnap & Bur'p	1,600 00	30
26	Lafayette Creamery	S.	Chamberl'n & Son	R. B. Harris	100	1890	Davis & Rankin	12,000 00	62
27	LaPaz Creamery Company	S.	Ira O. Dillie, M	Ira O. Dillie	100	1896	Brant & Davis	4,000 00	102
28	Lewisville Butter and Cheese Co	I.	J. F. Bollmeyer, M	O. J. Richardson	T.	1891	Davis & Rankin	4,500 00	103
29	Lowell Creamery	S.	Geo. O. Wilber	Geo. O. Wilber	T.	1890	Davis & Rankin	4,000 00	20 70
30	Macy Co-op. Butter and Creamery Co.		J. Carvey, S	John Carvey	100	1891	Davis & Rankin	4,950 00	120-175

31	Queen City Creamery	I.	W. E. Gould	W. E. Gould	T.	1894	Cornish & Green	800 00	......
32	Walter's Cheese Factory	I.	E. Walters	E. Walters	100	......	......	......	......
33	Farmers' Creamery Company	S.	J. E. Comb, S	M. J. Esterday	T.	1891	Davis & Rankin	4,500 00	127
34	Brook's Creamery	I.	Geo. W. Brooks	B. L. Hollister	T.	1887	Winchell & Co.	2,000 00	300
35	Jersey Creamery	I.	Fish & Colson	......	T.	1895	C. Pkg. Mfg. Co.	4,800 00	·280
36	New Haven Creamery	I.	Brudi & Bros	G. A. Brudi	T.	1893	Davis & Rankin	6,200 00	3
37	North Liberty Creamery	S.	W. D. Knott, M.	Chas. Logan	T.	1896	Chicago Mfg. Co.	3,800 00	60
38	North Manchester Creamery	I.	Silas Holloway	Silas Hollaway	T.	1891	Davis & Rankin	4,500 00	40-60
39	Orleans Creamery Company	I.	T. J. Burton, S	T. J. Burton	T.	1894	Burnap & Bur'p.	3,500 00	18-30
40	Wilson's Creamery	I.	W. D. Willson	Chas. Cottingham		1887	D. H. Roe & Co	2,500 00	......
41	Ossian Creamery Company	S.	J. C. Mason, S	J. C. Mason	T.	1887	C. D. Winchell	3,500 00	50
42	The Brooks Creamery	I.	S. H. Suflee, M.	S. H. Suflee	T.	1892	Davis & Rankin	4,500 00	......
43	Peru Creamery	S.	Sowers & Hall	W. Sowers		1892	Burnap & Bur'p.	5,500 00	20
44	Crown Creamery	I.	Swindell & Bro	......		1885	Various firms	......	......
45	Salamonia Creamery	I.	J. L. Cazlan	A. C. Hilfiker	T.	1892	Davis & Rankin	5,200 00	75-100
46	Spiceland Creamery Company	S.	J. W. Newby, S.	Herbert Newby	T.	1892	Various firms	2,350 00	40
47	Springport Butter and Cheese Co	S.	W. Hickman, M.	Willard Hickman	T.	1891	Davis & Rankin	4,700 00	30-40
48	St. John's Creamery Company	S.	W. F. Kellman, M.	Ed. Strong	T.	1894	A. H. Barber	3,000 00	50
49	Thorntown Creamery Company	I.	J. E. Smith	J. E. Smith	100	1891	Davis & Rankin	4,800 00	32
50	Union Mills Creamery Company	S.	D. H. Wakman, M.	W. S. Booth	T.	1891	Davis & Rankin	4,750 00	150
51	Wabash Co. Creamery and Can'ng Co.	S.	W. G. Gardner, S.	Glen Gardner	100	1891	Davis & Rankin	5,500 00	50-70
52	Oak Grove Creamery	I.	Schlosser Bros	S. H. Halderman	T.	1889	(?)	......	......
53	Big Eagle Creamery	I.	Beyer Bros	August Hafert	T.	1882	Haney & Cam'bell	3,000 00	250-300
54	Waymansville Creamery Company	I.	......	......	100	1892	Davis & Rankin	5,000 00	......
55	Westfield Butter Company	I.	N. D. Knight	N. D. Knight	T.	1891	Davis & Rankin	4,500 00	50
56	Westville Creamery	S.	C. E. Herrold, S	J. H. Hilfiker	T.	1896	C. E. Stubbs & Co.	3,950 00	42
57	Winona Ice Cream and Butter Fact'y	I.	P. Schlosser	Chas. Ulery	T.	1896	2d hand D. & R.	4,800 00	40
								$211,915 00	

S. Signifies stock or co-operative.
I. Signifies individual or private.
T. Signifies milk paid for by fat test.

100. Signifies milk paid for by 100 lbs., independent of fat test.
*4 per cent. fat basis.
C. Buys cream.

TABLE II. INDIANA CREAMERY RECORDS—1896.

No.	TOWN.	County.	Name of Creamery.	System.	Creamery Ever Insolvent.	Are Dairy Interests in County Growing.
1	Arcadia	Hamilton	Arcadia Creamery	Separator	No	Was
2	Bremen	Marshall	Cottage Grove Creamery	Separated and gathered cream		Yes
3	Brunswick	Lake	Brunswick Creamery Company	Separator	No	Yes
4	Cambridge City	Wayne	Columbia Cheese Factory	(Cheese factory)		Yes
5	Carlisle	Sullivan	Carlisle Creamery Company	Separator	No	Yes
6	Carthage	Rush	Carthage Butter and Cheese Factory	Separator	No	Think so
7	Centreville	Wayne	Centreville Creamery Company	Separator	No	Yes
8	Creston	Lake	West Creek Creamery	Separator		Yes
9	Cumberland	Marion	Cumberland Capital Creamery Company	Separator	No	Yes
10	Deedsville	Miami	Deedsville Creamery Company	Separator	No	Yes
11	Dyer	Lake	Dyer Creamery Company	Separator	No	No
12	Fairland	Shelby	Fairland Creamery	Separator	Yes	Not losing
13	Farmersburg	Sullivan	Farmersburg Co-operative Creamery	Separator	No	Yes
14	Francesville	Pulaski	Francesville Creamery Company	Separator	No	Not much
15	Freelandville	Knox	Freelandville Enterprise	(Cheese factory)		
16	Greenfield	Hancock	Greenfield Creamery	Separator	Yes	Yes
17	Hagerstown	Wayne	Hagerstown Creamery Company	Separator	No	Slowly
18	Hanna	LaPorte	Oak Grove Creamery	Separator	No	Yes
19	Hebron	Porter	Hebron Butter and Cheese Company	Separator	No	Yes
20	Huntertown	Allen	Huntertown Co-operative Creamery Co	Separator	No	Yes
21	Huntingburg	Dubois	Huntingburg Cheese Factory	(Cheese factory)	No	Somewhat
22	Huntington	Huntington	Garretson's Creamery			Yes
23	Hurlburt	Porter	Hurlburt Co-operative Creamery Co	Separator		Yes
24	Indianapolis	Marion	Furnas' Creamery	Gathered cream	No	
25	Klaasville	Lake	State Line Creamery Company	Separator		Yes
26	Knightstown	Henry	Blue River Creamery	Separator	No	Yes
27	LaFayette	Tippecanoe	LaFayette Creamery	Separator	Yes	No
28	LaPaz	Marshall	LaPaz Creamery Company	Separator	No	Yes
29	Lewisville	Henry	Lewisville Butter and Cheese Company	Separator	No	Yes
30	Lowell	Lake	Lowell Creamery	Separated and gathered cream	No	Yes
31	Macy	Miami	Macy Co-operative Butter and Cheese Co.	Separator	No	Yes
32	Marion	Grant	Queen City Creamery	Gathered cream		Yes
33	Mulberry	Clinton	Farmers' Creamery Company	Separator		Yes
34	Muncie	Delaware	Brooks' Creamery	Gathered cream	No	Yes
35	New Castle	Henry	Jersey Creamery	Separated and gathered cream	No	Yes
36	New Haven	Allen	New Haven Creamery	Separator	No	Not much
37	North Liberty	St. Joseph	North Liberty Creamery	Separator	No	Yes
38	N. Manchester	Wabash	North Manchester Creamery	Separator	Yes	Not much
39	Orleans	Orange	Orleans Creamery Company	Separator	No	Yes

40	Osgood	Ripley	W. D. Willson's	Sells milk	No	Yes
41	Ossian	Wells	Ossian Creamery Company	Separator	No	No
42	Parker City	Randolph	Brooks' Creamery	Gathered cream	Yes	Doubtful
43	Peru	Miami	Peru Creamery	Separator	Yes	No
44	Plymouth	Marshall	Crown Creamery	Gathered cream		No
45	Salamonia	Jay	Salamonia Creamery	Gathered cream	Yes	No
46	Spiceland	Henry	Spiceland Creamery Company	Separator	No	Yes
47	Springport	Henry	Springport Butter and Cheese Company	Separator	No	Slowly
48	St. John	Lake	St. John Creamery	Separator	No	Yes
49	Thorntown	Boone	Thorntown Creamery Company	Separator		No
50	Union Mills	LaPorte	Union Mills Creamery Company	Separator	No	Yes
51	Wabash	Wabash	Wabash County Cream'y and Canning Co.	Separator	No	No
52	Wanatah	LaPorte	Oak Grove Creamery	Separator	Yes	Yes
53	Warsaw	Kosciusko	Big Eagle Creamery	Gathered cream	No	No
54	Waymansville	Bartholomew	Waymansville Creamery Company	Separator	Yes	No
55	Westfield	Hamilton	Westfield Butter Company	Separator	No	Yes
56	Westville	LaPorte	Westville Creamery	Separator	No	Yes
57	Winona	Starke	Winona Ice Cream and Butter Factory	Separator		Yes

TABLE III. STATISTICS OF DEFUNCT CREAMERIES.

No.	LOCATION.	County.	Name of Creamery.	Co-operative or Otherwise.	When Built.	Who By.	Cost.	How Long Run.
1	Auburn	DeKalb	Auburn Creamery	Co-operative	1893	Davis & Rankin	$4,500	4 months
2	Aurora	Dearborn	Aurora Creamery	Co-operative		Davis & Rankin	6,200	2 years
3	Bellmore	Parke	Bellmore Butter and Cheese Co	Co-operative	1890	Davis & Rankin	4,200	2 years
4	Bluffton	Wells	Bluffton Creamery Company	Co-operative	1887	A. J. Stewart	4,000	7 years
5	Bridgeport	Marion	Alba Creamery	Private	1880	Arthur Jordan	500	7 months
6	Chalmers	White	Chalmers Creamery	Co-operative	1892	Davis & Rankin	5,800	2 years
7	Dana	Vermillion	Dana Creamery	Co-operative	1891	Davis & Rankin	4,300	2 years
8	Delphi	Carroll	Carroll County Creamery	Co-operative	1890	Davis & Rankin	7,000	1 year
9	Elkhart	Elkhart	Elkhart Creamery Company	Co-operative	1889		5.500	2 years
10	Flat Rock	Shelby	Flat Rock Butter and Cheese Co.	Co-operative	1891	Davis & Rankin	5,850	3 years
11	Fortville	Hancock	Fortville Creamery Company	Co-operative	1892	Davis & Rankin	5,000	1 year
12	Fowler	Benton	Fowler Creamery Company	Co-operative	1890	Davis & Rankin	4,900	6 months
13	Frankfort	Clinton	Frankfort Creamery Company	Co-operative	1887	Davis & Rankin	5,500	6 years
14	Franklin	Johnson	Cloverdale Creamery	Co-operative	1882	Jennings, Halseman & Hamilton	5,200	3 years
15	Friendship	Ripley	Lochery Valley Blue Grass Cr'm'y	Co-operative		Various parties	3,500	4 years
16	Fort Branch	Gibson	Fort Branch Creamery Company	Co-operative	1892 (?)	Davis & Rankin	5,000	Very little
17	Glenwood	Rush	Farmers' Butter and Cheese Fac'y	Co-operative	1891	Davis & Rankin	5,100	3½ years
18	Goshen	Elkhart	Goshen Creamery	Individual				10 years
19	Guilford	Dearborn	Guilford Creamery Company	Co-operative	1891	Davis & Rankin	6,000	3 months
20	Hanover Center	Lake	Hanover Center Creamery	Co-operative	1889 (?)			
21	Hartford City	Blackford	Farmers' Co-operative Creamery	Co-operative	1891 (?)	Davis & Rankin	4,250	1 year
22	Haubstadt	Gibson	Haubstadt Cheese Fac. and Cr'm'y	Co-operative	1888	Hedge & Padoller	1,600	¾ year
23	Hayden	Jennings	Hayden Creamery	Co-operative	1888	Hudson & Deputy	600	3 years
24	Hope	Bartholomew	Hope Creamery Company	Co-operative	1889	Davis & Rankin	5,000	2 years
25	Lebanon	Boone	Lebanon Creamery	Co-operative	1885	Davis & Rankin	4,000	2½ years
26	Medaryville	Pulaski	Medaryville Creamery Company	Co-operative	1891	Davis & Rankin	4,500	6 months
27	Merrillville	Lake	Merrillville Creamery Association	Co-operative	1895		3,500	1 year
28	Middlebury	Elkhart	Middlebury Creamery	Co-operative	1891	Davis & Rankin	4,000	½ year
29	Montpelier	Blackford	Montpelier Creamery	Co-operative	1892	Davis & Rankin	5,000	1 year
30	Orchard Grove	Lake	Orchard Grove Cheese Factory	Individual	1878	Waron & Carter	3,000	11 years
31	Patricksburg	Owen	Patricksb'g Butter and Cheese Fac	Co-operative	1892	Davis & Rankin	4,250	5 months
32	Patriot	Switzerland	Patriot Creamery	Co-operative	1893	Davis & Rankin	4,200	
33	Petersburg	Pike	Petersburg Butter and Cheese Fac	Co-operative	1891	Davis & Rankin	5,000	2 years
34	Remington	Jasper	Remington Creamery	Co-operative	1891	Davis & Rankin	4,500	3 years
35	Rensselaer	Jasper	Rensselaer Separator Butter Co	Co operative	1890	Davis & Rankin	5,000	6 years
36	Roann	Wabash	Roann Creamery	Individual	1890	Roann Creamery Co	5,500	3 years
37	Rochester	Fulton	Rochester Creamery	Co-operative	1893	Davis & Rankin	4,500	3 years (?)
38	Rockport	Spencer	Rockport Creamery	Co operative			2,200	

39	Royal Center	Cass	Royal Creamery Company	Co-operative			5,000	
40	Russiaville	Howard	Russiaville Butter and Cheese As'n	Co-operative	1891	Davis & Rankin	1,500	1 year
41	St. Joe	DeKalb	St. Joe Valley Creamery Company	Co-operative	1893	Davis & Rankin	4,000	2 years
42	Wadesville	Posey	Wadesville Creamery	Co-operative			3,300	6 months
43	Warren	Huntington	Warren Creamery Company	Co-operative	1894	Burnap & Burnap	4,500	1 year
44	Winchester	Randolph	Randolph County Creamery Co	Co-operative	1887	G. D. Winchell M. Co	4,500	1½ years
45	Zionsville	Boone	Zionsville Creamery Company	Co-operative	1892	Davis & Rankin	5,000	3 years
46	Geneva	Adams	Geneva Creamery Company	Co-operative	1892	Davis & Rankin	4,000	2 years
47	Kingsbury	LaPorte	Kingsbury Creamery	Private	1890		1,000	2 years
							$195,050	

Mr. Roberts: It seems to me that one of the most important things in the Indiana creamery business is the market. That is a question I would like to hear discussed. It seems to me that it is nearly impossible to sell butter anywhere in the State of Indiana for Elgin quotations, and it has been very hard to have a satisfactory market. I would like to hear the markets discussed a little in regard to this creamery business.

Mr. Commons: In our individual case we have taken some pains to work up private markets for our goods, although there is considerable of it goes on to the New York market during the summer season, just at the time we would prefer to have it go elsewhere, if we could, on account of the low prices prevailing. I do not see how we can go about it to improve our markets, outside of working up an individual demand for our products. You will have to fight the oleomargarine manufacturer in this country. I believe that would have a tendency to solve our problem quicker than anything else. I am satisfied there is a legitimate demand for every pound of butter that we can make at a reasonable profit, if it were not for the supply of oleomargarine sold as manufactured butter and creamery butter, as I have known it to be at prices below what we can afford to sell ours.

Mr. Shafer: I believe that the selling of butter is just like marketing leaf tobacco in Ohio, Indiana and Kentucky. I know persons who raise tobacco in Indiana, and they haul it over into Ohio to their friends, and it goes out as Ohio tobacco. As an illustration, a few years ago we had been making what we considered a first-class butter, but the commission man told us not to brand our butter at all, and we have ever since got Elgin prices. Indiana makes good butter. It is like the tobacco business; our butter is not rated as high in the markets as it ought to be.

Mr. Edgerton: Can you state the number of prizes that Indiana took at the Columbian Exposition? My recollection is that it was very creditable, indeed.

Prof. Plumb: I was there about a month, and I watched Indiana's display very carefully, and so far as any national competition went, I do not believe we made any very great impression. Our State exhibit was comparatively small, but there was some very excellent butter there from Indiana, there is no mistake about that. We are not dealing with individual cases; we are dealing with the State as a whole.

Mr. Benjamin: I would like to hear from Mr. Monrad on this market question.

Mr. Monrad: I believe, with Prof. Plumb, in discussing the market question, it is not so much with the market as it is with the quality. We can not control the selling price, but we can control the cost of production by following the advice of Prof. Hacker, which we had last night. We can not control the price of butter or cheese in London, but we can economize in the production. Now, that rule is certainly true and holds good for our local markets also. The creamery in each county should be a center of education, and if there is more than one in a county, they should get together. You should have local associations. Get together once a month, if possible, if not three or four times, and have a one-day session, and discuss the technical difficulties in butter-making. But I want more than that. I want the creamery men to go home to their own creameries and interest the farmers in local clubs. I don't care what you offer them, or what means you use to get them together—the young people especially, and the ladies, too. Get them together and try to explain to them that it is upon them the responsibility rests. You may think I am harping too much on that, but I have now for over thirty years studied this question of making good butter and good cheese, and I have come more and more to the conclusion that the making of these things is a simple problem compared to that of producing cheap and good milk. There is where we must put our educational forces to work, right at the production of milk, and the taking care of it, so that it arrives in good condition at the creamery. A butter-maker or cheese-maker can, as a rule, make good butter or cheese if he has good milk.

Now, as to the markets. I sympathize with the gentleman that raised the question, when he said that the farmers insist on selling their milk, on the basis of Elgin prices. I regret to say that Elgin has abused her privilege, according to my estimation as a market, because it has been manipulated up and down. It would be fairer to the creamery men if the price was based on New York; I think that would run steadier, and more even, the year through and be fairer all around. Mr. Commons is right when he says you can work up local markets, but that is hard work, and you cannot afford to pay the farmers higher prices than the general market will justify.

Now, we have found that sometimes if the price goes down below a certain point we can ship the product to Europe. There is no earthly reason why we should not. Why, we are shipping corn across to Europe, to Germany and Denmark, to feed their cows with, and these cows are kept on land worth all the way from $100 to $300 per acre. You ought to be able to produce butter at nearly one-half the price at which they can produce it over there, and you can compete with them. You must do it intelligently, though. Have the right cows, as Prof. Hacker said. I was there for several years, "hanging to a cow's tail," as the saying is. I know how difficult a matter it is for the young dairyman to get to go to see his best girl, or even to go to a political meeting sometimes. I was up in Minnesota during the last campaign and a liveryman drove me around. We drove past a farm where the cows had not been milked for twenty-four hours. What was the matter? The man was at a political meeting, and did not come home to milk his cows; did not come home at all until the next morning. If you want to farm that way, you had better stay out of the dairy business. As Governor Hoard says, the cow is a female, and very jealous, and if you want to go and flirt with other things—wheat or tobacco, or anything else in that way, you had better raise hogs or steers. If you are not faithful to the cow, she will not be faithful to you.

Mr. Van Norman: In regard to the scoring of the butter here—if those who did not get a prize think they are discriminated against and that the award is not right, they will never be satisfied, but if they come to the conclusion that there is something wrong with their butter, they can investigate and learn what it is. The trouble is that most of us think our butter is all right. The man selling butter must sell what the buyer wants.

Mr. Monrad: There is an excellent chance for the Indiana creamery men to get a fair and thorough comparison between Indiana creamery butter and that of other States. In February the National Butter-Makers' Association has its meeting at Topeka, Kan. You should join that Association and send a 60-pound tub of butter there to enter the competition. The Secretary is H. J. Nisley, Topeka, Kan. He will give you all the necessary information. There will be a very large exhibit there, and competent judges. One of the judges will be appointed from Boston, one from New York and one from Chicago.

Secretary Plumb: Two essays have been submitted in prize competition, one by Mrs. C. B. Benjamin, for the prize of $10 offered by the Association for the best essay on "Butter-Making," and the other by Mr. J. H. Monrad, for the prize of $10 offered by the Champion Milk Cooler Company, of Cortland, N. Y., for the best essay on "The Aeration and Cooling of Milk." If agreeable to the Association, I will now read these essays.

THE AERATION AND COOLING OF MILK.

PRIZE ESSAY BY J. H. MONRAD, WINNETKA, ILLINOIS.

Scientists tell us that the milk coming from a healthy cow, fed pure food, is virtually free from germs and pure, but practice teaches us that it is impossible to secure the milk in that condition.

Even if the milk comes from a perfectly clean stable, where the cows and everything else are kept clean, the immediate aeration and cooling of the milk is of incalculable value, providing always that it is done in a room where the air is pure.

Though no scientific explanation can be given us as to the reason why aeration improves the milk, yet it seems to me possible that it may be caused by the fact that many of the bacteria causing taint are anaerobic and develop best where the air is excluded, and that even if the lactic acid bacteria should develop a little, these are, if limited, really of benefit, giving flavor as shown in cream-ripening. That aeration eliminates many odors caused by gases is acknowledged by all.

That cooling the milk at once after milking is an enormous help in preserving it, is easily understood when we know that the development of all spores and bacteria is retarded exactly in proportion to the reduction of the temperature. This is best understood by the bacteriological experiments, which showed that milk containing originally 975 bacteria, kept at 59 degrees, multiplied in three hours 1.06 times; in six hours, 2.5 times, and in nine hours 5 times; whereas, at 77 degrees it multiplied in three hours 2 times; in six hours, 18.5 times, and in nine hours, 107.5 times; and at 95 degrees they multiplied, in three hours, 4 times; in six hours, 1,290 times, and in nine hours, 3,794 times. On the other hand, if kept at 45 degrees, having been cooled to that temperature at once after milking, there is hardly any increase at all. It is thus evident that, combining aeration with cooling as soon as possible after milking, we gain a double effect, and this is best obtained by letting the milk flow over a surface of tin, or tinned copper. which is cooled by cold water or ice.

It is also evident that the easier such an apparatus is kept clean, the better it is. If for unavoidable reasons (?) the milk can not be treated at once, I feel inclined to advise reheating it to 98 or 110 degrees before aerating and cooling.

In view of some practical experiments made by me, I can not urge the aerating and cooling of all milk too strongly, not only for direct consumption but for creameries and cheese factories.

I do not fear being accused of exaggeration if I claim that if all milk brought to our factories were thus treated it would improve the quality of our butter with at least one-fourth cent, and our cheese with one-half cent per pound, and this would virtually be an increased annual value of these products aggregating over one million dollars.

BUTTER MAKING.

PRIZE ESSAY BY MRS. C. B. BENJAMIN, LEROY.

Butter-making, like love-making, is an "old, old story," oft repeated, but yet there is always something to learn from the continued repetition of this tale. While butter is one of the necessities, there is always a demand for good butter, and the dairyman or woman who makes this article will readily find a profitable market.

It has been conceded by all good dairymen that one of the first essentials is a thoroughbred sire and a herd of butter-making cows. Not necessarily registered cows bought at a long price, but cows that we know are paying a fair profit for their food, and the labor of caring for them and their product.

The next step is to see that our cows are comfortably housed. By this we do not mean they shall be kept in a palatial barn of many domes and gables, for ofttimes just as good butter has been made from the cow standing in the "lean-to" as in the well-finished barn. Provide comforts and fresh air and she will respond without luxuries.

Having secured this proper shelter, the cows should receive a variety of palatable, wholesome food that will in no way taint or contaminate the butter product, and be kept perfectly clean. This last item must be emphasized, for no matter how bright and clean the pails, cans, separators, churns, etc., if the cows are filthy and kept in filthy stables, we cannot make pure butter. The udder should be thoroughly wiped or brushed, that all loose hairs or particles of dirt may be removed before attempting to milk.

As soon as the milk is drawn, and it should be done quickly and quietly, we will take it at once to the creamer or separator, as the case may be. If separated, and we have no regular aerator, the cream must be stirred while cooling that the animal odors may escape with the heat.

Whether we use the separator or skimming process, the cream must be kept perfectly sweet and free from all objectionable odors until enough is secured for a churning. Having obtained the desired amount, we will proceed to ripen it preparatory to the churning.

This is done by heating the cream to a temperature of about 80 degrees, adding the starter, if one is to be used, and holding it at that temperature, stirring often, until of the proper consistency. The cream will have sufficiently ripened in twelve or fourteen hours, when it will be thick, and the surface should present a smooth, glossy appearance. It is then cooled to a temperature of 62 or 64 degrees. This, of course, is governed somewhat by the weather, as in the summer we churn at a much lower temperature than in winter, when the room and atmosphere are necessarily cooler. Each butter-maker must exercise a certain amount of judgment on this point, but in all cases a cream thermometer is an absolute necessity.

Our cream is now ready for the churn, which should be one without inside fixtures, coloring added to suit the taste of our customers, and the churn set in motion.

When the butter has formed in tiny granules, the churn should be stopped and a little salt added. This causes a more thorough separation of the butter and buttermilk, and, in a measure, prevents streaks in the butter. A few revolutions of the churn finishes the operation, and we draw off the buttermilk and add water of about the same temperature.

The butter must be washed through two or three such waters, then left to drain, after which it is salted in granular form, in the churn or removed to the butter-worker and salted in the same form.

An ounce of salt to a pound of butter is the general rule, but this must be governed by the taste of those who eat the butter, some requiring more and some less salt. But whether we use much or little, if the salt is thoroughly incorporated in the butter while in granular form, we will have little or no trouble with "streaked butter."

Very little "working" is necessary for butter made in this way, as the buttermilk has been washed out and the only requisites are to press it into a compact mass and remove the surplus brine.

If worked and handled more than is necessary, the grain will be injured and we will have an oily substance, rather than a good, firm butter. It should be packed immediately in tubs, stone jars, or made into prints, as our customer demands, and marketed as soon as possible.

Having followed out the above plans, observing perfect and thorough cleanliness from beginning to end, we think we have a pure and wholesome article.

All persons making butter for a profit should read, study and make an effort to become proficient in the business they have undertaken. A man taking up a profession studies and thoroughly prepares himself in that branch. If he undertakes his profession without the necessary education in that line he is called a "quack." So it is in butter-making. On our farms are countless numbers of "quack" butter-makers, whose only aspiration is to exchange their product at the country store for groceries. Some butter-makers in following this plan become indifferent and say, Why need we make an effort to produce a good article when we receive no more for it than those who sell what might justly be called grease?

Every butter-maker should aspire to a certain degree of perfection, following out each step in the operation with care and judgment, and keeping constantly before him the goal for which he is striving.

We might change somewhat the wording and sentiment of Holland's poem to apply to the butter-maker by saying:

Success is not reached by a single bound,
But we build the ladder by which we rise,
From the meek old cow to the coveted prize,
And mount to its summit round by round.

The butter-maker who engages in this business for profit, with willing hands, an active mind and a strong determination to reach his goal, will surely succeed, "for his heart is in his work and the heart giveth grace unto every art."

Mr. Monrad: I think it is dangerous to ripen at 80 degrees. It can be done, but I don't think that should be accepted as the standard.

Mr. Beckman: Cream ripened at this high temperature is more likely to develop odors.

President Stubbs: It was supposed until very recently that Mr. Jenkins, who is on the program, had failed us. We now learn that he has sent his son to the meeting to represent him, and he will now read his paper on

TESTING DAIRY COWS.

BY D. H. JENKINS, EDITOR "JERSEY BULLETIN," INDIANAPOLIS.

Before going to any length in the subject assigned me by the worthy officers of this Association, permit me to say that the matter of testing dairy cows is a very interesting one to me personally, one that has engaged me in numerous discussions with experienced men of varied opinions. The conclusion arrived at is that while men will differ as to mode of procedure, their one idea is to test the cow to find out whether she pays for her bran or not.

Cows are tested in order that their owners may ascertain their intrinsic value for butter-making and for breeding, and in order to determine which of two or more cows of the same breed, or which of two breeds, is the better.

But what is meant by testing? An eminent authority, who might be more frequently quoted with benefit, and who is responsible for a valuable work, entitled "Webster's Unabridged Dictionary," defines the verb "test" thus: "To put to the proof." To be sure he has more to say, but that definition, "to put to the proof," is the closest connection I can find of the word "test" with dairy cows. You put your cows to the proof, and they are tested, whether they fail or succeed in attaining a given standard. In every herd there is a marked difference in the capacity of the different cows. The best cows will breed the best calves. It is, therefore, a dictate of common sense, as well as business, to select the best for breeders. Whenever a breeder begins testing his cows, he will begin selecting and culling, and he is a lucky man who owns twenty cows and is not disagreeably surprised to find that some of them are barely paying for what they eat. They are the cows he wants to kill, or sell to the man who doesn't believe in tests.

How to test dairy cows has been much debated, and is yet to a considerable extent. Whether you are going to test your cows for milk, for butter or for butter-fat, the method employed must furnish proof that what your test develops is true.

Leaving out the question of net profit, if you want to test for amount of milk, indisputable proof is demonstrated by weighing the milk drawn from a cow on scales that are perfect.

If you want to test for the fat in milk, use a perfectly made Babcock tester; take a correct sample, and if you know how to manage the intricacies of such an operation, pour in your acid, et cetra, whirl the machine and you have an indication of the amount of butter-fat in that sample of milk. This is, I believe, the most accurate test of the kind.

If you want to test for butter, you must separate the cream from the milk drawn, churn it, and weigh the butter. The butter is the proof, and your cow has a butter test. The Babcock is not a necessity to an accurate or trustworthy butter test. It is, however, one of the most valuable instruments ever invented for dairymen. To the creamery or cheese factory, where milk is bought, it has come to be a necessity, and for the private dairy it is a great convenience, but not a necessity. The reputation of the Babcock was made at the World's Fair by its close agreement with the churn. Had it disagreed with the churn to any material extent in the great tests conducted there it would have been laid aside as untrustworthy. The three different tests I have outlined for milk, fat and butter are too often confounded by the newspapers, and some dairymen. A man will say: "This cow has a butter test; her milk showed 5 per cent. of fat for a certain length of time." But if that cow's milk has not been churned nor the butter weighed, she has no butter test, for she has not been "put to the proof" for butter.

Where should dairy cows be tested? From a common-sense standpoint there is but one proper place to test a cow, and that is where her daily work is done, in her own stall, surrounded by familiar persons and conditions. Experience and experiment confirm this view. Public tests on show grounds, amid the noise and excitement of fairs, may or may not do the cow justice. As a rule, the better the cows the less likely they are to do themselves justice under such tests. Trials of cows for butter at home are known in the dairy world as private tests. The attempts to discredit these private tests, or to question either the ability, the integrity or the intelligence of the thousands of men in every part of the United States who have made and certified them have, one after another, failed ignominiously. These tests stand as high to-day, are accepted as implicitly and relied on as confidently as any tests made by official committees, by State officers or by experiment station experts.

While we test dairy cows to find out whether or not they pay for their keep, the greatest value attached to testing is to increase the commercial worth of the animals with tests, and that of their offspring. Buyers of pedigreed dairy stock will pay far better prices for young stock out of dams tested for butter production than they will for others. The bigger the test the better. Still, it is no longer necessary to force cows to large yields by high-feeding. The time was when it was necessary, in order to demonstrate to what extent the cow would assimilate food and turn it into butter. The high feeding may have killed several cows, but their sacrifice was a necessity in proving the capacity of the breed. This is particularly true of the Jersey breed. So thoroughly is the butter-making capacity infused into the blood of the Jersey that there is not a family of any size that has not developed 14-pound cows, and it is not an extravagant vision to look forward to the day when every registered Jersey cow shall also be a 14-pound cow. Pardon any special mention of the Jersey cow at this dairy meeting, but the fact that the Jerseys make the butter.

and the butter makes the dairy, "the eternal fitness of things" renders the reference to that breed a consistency.

The butter test originated with Jersey cows, and prevails among that breed to a greater extent to-day than among all other breeds combined. Other dairy breeds have followed, but not in exactly the same line. Their owners appreciated the value of butter tests from observation of the progress the Jersey was making in popularity, all because the breeders of Jerseys were far-sighted enough to test their cows for butter in the only possible way, by churning it. But breeders of other cattle did not have the cows that would make as large tests as did, and do, the Jerseys. So they were forced to be content with a "butter" test, which is no butter test, because it does not "put to the proof" the cow's capacity for making butter, but one which gives an indication of something which might be butter; in this test, neither the flavor, grain nor color of butter is obtained.

In conclusion, I say, test your cows—for a day, a week, a month, and for a year. Test single cows, and test your herd. Test them for milk, for butter and for the profit they pay or, it may be, the loss they bring you. Test by the scales, by the Babcock and by the churn, but do not, I pray you, Babcock a gill of milk, multiply it, and call the result a butter test.

DISCUSSION.

Mr. Monrad: I think Mr. Jenkins is making one mistake in advocating the churn test as compared with the Babcock test, because in using the churn we use the uncertain element of the skill of the butter-maker, but with the Babcock test it is easy to get the actual test.

Mr. Jenkins, Jr.: My experience with the Babcock test has been very limited, but it does not seem to me that you find out how much butter the cow will make by the Babcock test. You can take it and compare two or three or more cows with each other, and see which is best, but you cannot tell as accurately as by the churn how much butter the cow will make. We appreciate, and I appreciate as well as the author of the paper, the place the Babcock test is entitled to, but its place is not to make a butter test. It is a good test of milk, but not a butter test. (Applause.)

Mr. Monrad: I will say that, taking into consideration the skill of the butter-maker, the uncertainty with the churn is ten times as great as the small difference in calculation in the Babcock test. I am willing to concede that no milk or cream churns better than the Jersey cream. Now, we have come and demonstrated that a mechanical separator will take out all the fat under all conditions when properly run. I claim we get the clear truth using the Babcock test. The Babcock test has done more to demonstrate the superiority of the Jersey breed than any other one thing.

Mr. Jenkins: I will have to defend myself from the impression Mr. Monrad his given—that the Jersey people are trying to down the Babcock test.

Mr. Monrad: No, sir, I did not say that. That is the impression that would be gained from your article.

Mr. Jenkins: It is not a test for butter.

Mr. Monrad: It shows how much butter you and I ought to make out of it. I didn't want this paper to go on record without some contradiction.

Mr. Knox: The Babcock test is all right in the hands of an experienced operator, but in the hands of the uneducated along this line it is not as accurate to my mind as the churn.

President Stubbs: The time has now arrived for the transaction of miscellaneous business. There are committees to report, and the officers to elect for the next year.

RESOLUTIONS.

The Committee on Resolutions made the following report, which, upon motion, was accepted, and the report of said committee approved:

"Whereas, Divine Providence has permitted us to again assemble in honor of the dairy interests of the State of Indiana,

"Be it resolved, That we extend a vote of thanks to the people of Lewisville and vicinity for the royal manner that they have entertained us, and also to the people of this church for the use of this room; and also to the members of the Order of Knights of Pythias, for the use, gratis, of their lantern to assist in the lecture of Prof. Smith; also for the generous donation of $10 to this Association by our worthy brother, J. H. Monrad.

"Resolved, That, as members of the Indiana State Dairy Association, we are unequivocally opposed to the manufacture and sale of oleomargarine in our State, and that we recommend to our representatives, both State and National, the enactment of such laws as shall prohibit the manufacturers of oleomargarine from coloring their product in imitation of genuine butter, and also to enact laws compelling dealers in oleomargarine to sell it for what it is.

"Resolved, That we, as farmers, dairymen and citizens, recommend the sending of men to our Legislature who will look more to our interests in the future than in the past.

Resolved, That we, the members of the Indiana State Dairy Association, are in favor of our organization being well represented at the Trans-Mississippi Exposition, and favor leaving the arrangements thereof to the Executive Board of this Association.

"Resolved, That creamery managers and butter-makers be encouraged and earnestly solicited to attend the National Butter-Makers' Association convention, to be held at Topeka, Kan., in February, 1898.

"Resolved, That in view of the fact that the duties of the Secretary-Treasurer are such that that officer must devote a considerable amount of time, to say nothing of trouble, to properly perform these duties, and in view of the fact that these duties will be very much increased from this time on; therefore, be it

"Resolved, That this Association vote a suitable annual salary to this officer, the amount to be decided by the Executive Board.

"Whereas, It is to the best interests of dairy owners and farmers, as well as the whole public, that dairies and farms should be kept free from disease; therefore, be it

"Resolved, That this Association most earnestly solicits the advice and aid of the health authorities and of all physicians in the matter of disease prevention.

"Resolved, further, That we advise the formation of sanitary associations in every community, to the end that the cause of disease-prevention may be advanced."

Mr. Van Norman: I wish to offer the following resolutions in addition to those already offered:

"Resolved, by the visitors from abroad to the eighth annual meeting of the Indiana State Dairy Association, at Lewisville, Ind., That we hereby express our hearty appreciation of the kind and wholly delightful manner in which the good people of Lewisville have entertained their guests. Our experience at this meeting of the Association again demonstrates the wisdom of locating the meetings of this and similar agricultural associations in the smaller rather than in the larger cities.

"We also especially thank the ladies who have furnished the excellent meals in the neighboring hall. May their beauty grow perfect by transcending their cooking."

Prof. Plumb: I move that this Association, in convention assembled. express its hearty appreciation of the work that the honorable Secretary of Agriculture at Washington is doing toward promoting the production of good butter in the United States, and its sale in foreign lands. This motion is seconded, put by the President, and announced as carried.

The President announced the following as the Committee on Legislation: J. J. W. Billingsley, Frank P. Johnson, J. S. Moore, W. S. Commons and G. W. Drischel.

Prof. Plumb: I wish to move that the Constitution and By-Laws be so amended that the Secretary-Treasurer have the privilege, if he so desires, of appointing a person as Assistant Secretary. I think it is appropriate for me to explain why I make that motion. As Secretary of this meeting I have been so constantly engaged in looking after the Association, the dairy show, making out certificates of membership, and one thing or another, that it has kept me driven from the time I reached Lewisville. Now, if the Secretary can have the privilege of appointing some person as his deputy, or as Assistant Secretary, to help him in getting the exhibits in place, and in looking after the many details, it will save a great deal of time, and I think will be in the interest of the Association. I think the Association can afford to allow such a motion to prevail and allow the expenses of an Assistant Secretary to attend this meeting and aid in this work. He could be and should be a member of the Association.

Mr. Moore: I move that the By-Laws be so amended as to provide for the appointment of an Assistant Secretary by the Secretary-in-Chief; this motion is seconded, and put by the President, and announced as carried.

The Committee on Nominations makes the following report:

"Your Committee on the Nomination of Officers to serve the ensuing year begs leave to present the following: President, Sam. B. Woods, Lake County; Vice-President, O. P. Macy, Morgan County; Secretary-Treasurer, C. S. Plumb, Lafayette; Executive Committee, Sam. B. Woods, O. P. Macy, C. S. Plumb, J. J. W. Billingsley and W. S. Commons."

On motion the above report is accepted and approved.

Mr. Woods: I am proud of the honor you have conferred on me. I would rather be President of this Association than captain of an army. I am in the dairy business, and it is a good deal as a fellow once said, "All Woods knows is the dairy business." I have been at it about fifteen years and I have given my attention to it. I have attended the Association meetings for the last four years, and I take a great deal of interest in them, and I shall always do all I can to aid the Association in every way I can. In this I want the co-operation of every dairyman and dairywoman in the State of Indiana to help us, and if we take hold and do our best we can have a grand Association.

President Stubbs: In behalf of the people of Lewisville and surrounding country I wish to extend to our visitors an expression of our high appreciation of this convention, and of the mention you have made of us and of our entertainment of you while you have been with us.

The Convention then adjourned sine die.

FINANCIAL STATEMENT.

(Out of State Appropriation.)

C. S. Plumb, Secretary-Treasurer, to the State Dairy Association, Dr.:

1897.		Dr.	Cr.
Nov. 16.	By cash received from Auditor of State....		$100 00
Nov. 25.	To printing program of 1897 meeting.......	$6 25	
Nov. 19.	To postage	6 00	
Nov. 26.	To postage	1 10	
Nov. 30.	Express charges	30	
Nov. 25.	Express charges	25	
Dec. 4.	To printing 500 blank receipts............	2 50	
Dec. 13.	To 6 books and 100 score cards...........	5 00	
Dec. 21.	Postage	56	
	Total	$21 96	$100 00
	To balance	78 04	
		$100 00	$100 00

(Miscellaneous Account.)

Indiana State Dairy Association in account with Secretary-Treasurer:

1897.			Dr.	Cr.
Jan.	1.	To balance due H. C. Beckman	$2 01	
Jan.	1.	To hotel and car fare, H. C. Beckman, at 1896 meeting at Lebanon	5 10	
Jan.	1.	To receipt and scratch books, pens, ink and pencils	35	
Jan.	1.	Postage	40	
Jan.	6.	By cash from Ed Sudendorf		$5 00
Jan.	8.	By cash from A. F. Ward		3 00
Jan.	8.	To prize money paid out	34 98	
Jan.	8.	Envelopes, by H. C. Beckman	60	
Jan.	8.	To writing paper	3 50	
Jan.	8.	To postage	1 50	
Jan.	8.	To stenographer's services	25 00	
May	21.	To hotel expenses at Indianapolis, H. C. Beckman, Executive Committee meeting.	1 00	
May	21.	To express	25	
May	21.	To expenses, H. C. Beckman, attending Executive Committee meeting at Indianapolis	2 90	
Aug.	31.	To Home Journal Printing Company, printing annual report for 1896	50 00	
Oct.	4.	To postage	1 00	
Oct.	6.	To postage	1 29	
Oct.	6.	By advertisement, H. C. Beckman		5 00
Oct.	6.	By memberships		42 00
Oct.	7.	Advertisement 1896 report, P. M. Sharpless.		10 00
Oct.	7.	Advertisement in 1896 report, DeLaval Separator Co.		10 00
Oct.	9.	Advertisement in 1896 report, Vermont Farm Machine Co		10 00
Oct.	9.	Advertisement, Champion Milk Cooler Co.		5 00
Oct.	9.	To postage	75	
Oct.	13.	Advertisement, Worcester Salt Co		10 00
Oct.	14.	Advertisement, Cornish, Curtis & Green		10 00
Oct.	22.	Advertisement, Studebaker Mfg. Co		5 00
Dec.	2.	By membership fees, F. L. Jones and G. W. Drischel		2 00
Dec.	14.	By membership fee, O. P. Macy		1 00
Dec.	21.	By membership fee, H. F. Rotermund		1 00
Dec.	27.	By membership fee, C. W. Lisman		1 00
		Total	$130 63	$120 00
		To balance		10 63
			$130 63	$130 63

APPENDIX.

BUTTER AND CHEESE ENTRIES AND AWARDS AT INDIANA STATE FAIR, 1897.

Prize No. 596.—For the Best 30-lb. Tub Creamery Butter, $20.00.

R. W. Furnas, Indianapolis	97½	*	†
R. W. Furnas, Indianapolis	96	*	†
R. W. Furnas, Indianapolis	95½	*	†
Centreville Creamery	95	*	†
Webster Creamery	94½	*	†
Thorntown Creamery	94½	*	§
Hagerstown Creamery	94		§
Harry J. Matthews, Brunswick	93½	*	‡

First, R. W. Furnas; special by the DeLaval Separator Company, R. W. Furnas; special by Worcester Salt Company, R. W. Furnas.

Prize No. 597.—For the Best 15-lb. Tub of Dairy Butter, the Product of One Herd, and Made on the Farm, $20.00.

Wm. Hoadley, Ockley	95	*	†
Maple Grove Dairy, Syracuse	94	*	†
Margaret Snell, Muncie	93½		†
Maggie Garretson	93½		‖
Peter Raab	93½		‡
Zonetta Vance, Springport	93		
Harvey Johnson, Logan, Iowa	93		
Anna Raab, Brightwood	93		
Otto Meyer, Cedar Lake	92½	*	†
Mrs. Robt. Mitchell, Princeton	92½	*	†
James Riley, Thorntown	92½		

First to W. J. Hoadley.

Prize No. 599.—For the Best Five Pounds Dairy Butter in One-pound Prints, $15.00; second, $10.00.

J. S. Neff, Syracuse	96		†
W. J. Hoadley, Ockley	95½	*	†
Marie Albertson, Hazlewood	94½		

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*Used Worcester Salt, †DeLaval Separator, ‡United States Separator, ‖Sharpless Separator, §Jumbo Separator.

John Harvey, Carmel	94½	*	†
Peter Raab, Brightwood	94½		‡
Maggie Garretson, Pendleton	94½		‖
E. J. Shaw, Plainfield	94		
Peter Raab, Brightwood	94		‡
J. M. McFarland, Southport	94		
Frances Henshaw, Carmel	93½	*	†
J. P. McFarland	93½		
James Riley, Thorntown	93½		†
Margaret Snell, Muncie	93		†
Betty Close, Bargesville	92½		
Stella Atwood, Franklin	92		
Mrs. Robert Mitchell, Princeton	92	*	†
Harvey Johnson, Logan, Iowa	92		
Maple Grove Dairy, Syracuse	91	*	†
Zonetta Vance, Springport	91½		
J. H. Porter, Maywood	91½		
Mrs. W. B. Flick, Lawrence	86		

First, J. S. Neff, Syracuse, Ind.; second, Wm. J. Hoadley, Ockley, Ind.

Prize No. 600.—Best Five Pounds Dairy Butter in One-pound Prints, Made by a Girl under 20 Years Old, $15.00; Second Prize, $10.00.

Stella Atwood, Franklin	95½
Maggie Garretson, Pendleton	94
Marie Albertson, Hazlewood	93

First, Stella Atwood; second, Maggie Garretson.

Prize No. 601.—Best Five Pounds Dairy Butter in One-pound Prints, Made by a Graduate of a Dairy School, $15.00; Second Prize, $10.00.

W. J. Hoadley, Ockley	First.
W. F. Smith, Thorntown	Second.

Prize No. 602.—Best Full-Cream Cheese, $20.00; Second Prize, $10.00.

Boyd & Drischel, Cambridge City.
Wm. F. Smith, Thorntown.
A. Schoenman, Plain, Wis.
Peter Ammon, Ripon, Wis.
Thorntown Creamery.
A. S. McDonald, Tivoli, Ill.
Wm. McCain, Hortonville, Ind.

First, Boyd & Drischel; second, W. F. Smith.

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* Used Worcester Salt, † DeLavel Separator, ‡ United States Separator, Sharpless Separator, § Jumbo Separator.

Prize No. 596 **was $40.00, which was divided on the basis of score between all exhibits of 30-pound tubs of creamery butter, other than the one receiving the first award, and each of these to score above 85 points.**

Prize No. 598 **was $40.00, which was divided on the basis of score between all the 15-pound tubs of dairy butter, other than the one receiving first award, each of these to score above 85 points.**

H. B. HOWLAND,
Superintendent Dairy Exhibit.
H. C. BECKMAN,
Assistant Superintendent.
E. F. DOOLITTLE,
Judge.

LEGAL STANDARDS FOR MILK—DAIRY LAWS.

FROM "MILK AND ITS PRODUCTS," BY H. H. WING.

The following States and Territories, viz.: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Idaho, Illinois, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, Montana, Nebraska, Nevada, New Mexico, North Carolina, North Dakota, Oklahoma, South Dakota, Tennessee, Texas, Virginia, West Virginia and Wyoming, have established no legal standard.

The Dominion of Canada, Indiana and Utah have general laws prohibiting dilution or skimming.

In the other States the percentage standards are as follows:

	Specific Gravity.	*Total Solids, Per Ct.*	*Fats Per Ct.*
District of Columbia	....	12	3
Georgia	....	12	3.5
Iowa	....	....	3
Maine	....	12	3
Massachusetts (Apr. to Aug., inclusive)	....	12	3
Massachusetts (Sept. to Mar., inclusive)	....	13	3.7
Michigan	1.029-1.033	12.5	3
Minnesota	....	13	3.5
New Hampshire	....	13	
New Jersey	....	12	
New York	....	12	3
Ohio (May and June)	....	11.5	2.88
Ohio (July to April, inclusive)	....	12	3

	Specific Gravity.	*Total Solids, Per Ct.*	*Fats, Per Ct.*
Oregon	....	12	3
Pennsylvania*	1.029-1.033	12.5	3
Rhode Island	....	12	2.5
South Carolina	....	11.5	3
Vermont (May and June)	....	12	
Vermont, (July to April, inclusive)	....	12.5	3.25
Washington	....	....	3
Wisconsin	....	....	3

The full text of the national oleomargarine and filled-cheese laws are as follows:

THE NATIONAL OLEOMARGARINE LAW.

An Act defining butter, also imposing a tax upon and regulating the manufacture, sale, importation and exportation of oleomargarine.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That for the purpose of this act the word "butter" shall be understood to mean the food product usually known as butter, and which is made exclusively from milk or cream, or both, with or without common salt, and with or without additional coloring matter.

Section 2. That for the purposes of this act certain manufactured substances, certain extracts, and certain mixtures and compounds, including such mixtures and compounds with butter, shall be known and designated as "oleomargarine;" namely: All substances heretofore known as oleomargarine, oleo, oleomargarine oil, butterine, lardine, suine and neutral; all mixtures and compounds of oleomargarine, oleo, oleomargarine oil, butterine, lardine, suine and neutral; all lard extracts and tallow extracts; and all mixtures and compounds of tallow, beef-fat, suet, lard, lard-oil, vegetable oil, annatto and other coloring matter, intestinal fat, and offal fat made in imitation or semblance of butter, or when so made calculated or intended to be sold as butter, or for butter.

Sec. 3. That special taxes are imposed as follows:

Manufacturers of oleomargarine shall pay six hundred dollars. Every person who manufactures oleomargarine for sale shall be deemed a manufacturer of oleomargarine.

Wholesale dealers in oleomargarine shall pay four hundred and eighty dollars. Every person who sells or offers for sale oleomargarine in the original manufacturer's packages shall be deemed a wholesale dealer in oleomargarine. But any manufacturer of oleomargarine who has given the required bond and paid the required special tax, and who sells only oleomargarine of his own production, at the place of manufacture, in the original packages to which the tax-paid stamps are affixed, shall not be required to pay the special tax of a wholesale dealer in oleomargarine on account of such sales.

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*Applies only to cities of the second class.

Retail dealers in oleomargarine shall pay forty-eight dollars. Every person who sells oleomargarine in less quantities than ten pounds at any one time shall be regarded as a retail dealer in oleomargarine. And sections thirty-two hundred and thirty-two, thirty-two hundred and thirty-three, thirty-two hundred and thirty-four, thirty-two hundred and thirty-five, thirty-two hundred and thirty-six, thirty-two hundred and thirty-seven, thirty-two hundred and thirty-eight, thirty-two hundred and thirty-nine, thrity-two hundred and forty, thirty-two hundred and forty-one, thirty-two hundred and forty-three of the Revised Statutes of the United States are, so far as applicable, made to extend to and include and apply to the special taxes imposed by this section, and to the persons upon whom they are imposed.

Sec. 4. That every person who carries on the business of a manufacturer of oleomargarine without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than one thousand and not more than five thousand dollars; and every person who carries on the business of a wholesale dealer in oleomargarine without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than five hundred nor more than two thousand dollars; and every person who carries on the business of a retail dealer in oleomargarine without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than fifty nor more than five hundred dollars for each and every offense.

Sec. 5. That every manufacturer of oleomargarine shall file with the Collector of Internal Revenue of the district in which his manufactory is located, such notices, inventories and bonds, shall keep such books and render such returns of material and products, shall put up such signs and affix such number to his factory, and conduct his business under such surveillance of officers and agents as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may, by regulation, require. But the bond required of such manufacturer shall be with sureties satisfactory to the Collector of Internal Revenue, and in a penal sum of not less than five thousand dollars; and the sum of said bond may be increased from time to time and additional sureties required at the discretion of the collector, or under instructions of the Commissioner of Internal Revenue.

Sec. 6. That all oleomargarine shall be packed by the manufacturer thereof in firkins, tubs or other wooden packages, not before used for that purpose, each containing not less than ten pounds, and marked, stamped and branded as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe; and all sales made by manufacturers of oleomargarine and wholesale dealers in oleomargarine shall be in original stamped packages. Retail dealers in oleomargarine must sell only from original stamped packages, in quantities not exceeding ten pounds, and shall pack the oleomargarine sold by them in suitbale wooden or paper packages, which shall be marked and branded as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe. Every person who knowingly sells or offers for sale, or delivers, or offers to deliver, any oleomargarine in any other form than in new wooden or paper packages as above described, or who packs in any package oleomargarine in any manner contrary to law, or who falsely brands any package or affixes a stamp on any package denoting a less amount of tax than that required by law, shall be fined for each offense not more than one thousand dollars and be imprisoned not more than two years.

Sec. 7. That every manufacturer of oleomargarine shall securely affix, by pasting on each package containing oleomargarine manufactured by him a label on which shall be printed, besides the number of the manufactory, and the district and State in which it is situated, these words: "Notice.—The manufacturer of the oleomargarine herein contained has complied with all the requirements of law. Every person is cautioned not to use either this package again or the stamp thereon again, nor to remove the contents of this package without destroying said stamp, under the penalty provided by law in such cases." Every manufacturer of oleomargarine who neglects to affix such label to any package containing oleomargarine made by him, or sold or offered for sale by or for him, and every person who removes any such label so affixed from any such package, shall be fined fifty dollars for each package in respect to which such offense is committed.

Sec. 8. That upon oleomargarine which shall be manufactured and sold, or removed for consumption or use, there shall be assessed and collected a tax of two cents per pound, to be paid by the manufacturer thereof; and any fractional part of a pound in a package shall be taxed as a pound. The tax levied by this section shall be represented by coupon stamps; and the provisions of existing laws governing the engraving, issue, sale, accountability, effacement, and destruction of stamps relating to tobacco and snuff, as far as applicable, are hereby made to apply to stamps provided for by this section.

Sec. 9. That whenever any manufacturer of oleomargarine sells, or removes for sale or consumption, any oleomargarine upon which the tax is required to be paid by stamps, without the use of the proper stamps, it shall be the duty of the Commissioner of Internal Revenue, within a period of not more than two years after such sale or removal, upon satisfactory proof, to estimate the amount of tax which has been omitted to be paid, and to make an assessment therefore and certify the same to the collector. The tax so assessed shall be in addition to the penalties imposed by law for such sale or removal.

Sec. 10. That all oleomargarine imported from foreign countries shall, in addition to any import duty imposed on the same, pay an internal revenue tax of fifteen cents per pound, such tax to be represented by coupon stamps as in the case of oleomargarine manufactured in the United States. The stamps shall be affixed and canceled by the owner or importer of the oleomargarine while it is in the custody of the proper custom house officers; and the oleomargarine shall not pass out of the custody of said officers until the stamps have been so affixed and canceled, but shall be put up in wooden packages, each containing not less than ten pounds, as prescribed in this act for oleomargarine manufactured in the United States, before the stamps are affixed; and the owner or importer of such oleomargarine shall be liable to all the penal provisions of this act prescribed for manufacturers of oleomargarine manufactured in the United States. Whenever it is necessary to take any oleomargarine so imported to any place other than the public stores of the United States for the purpose of affixing and canceling such stamps, the collector of customs of the port where such oleomargarine is entered shall designate a bonded warehouse to which it shall be taken, under the control of such customs officer as such collector may direct; and every officer of customs who permits any such oleomargarine to pass out of his custody or control without compliance by the owner or importer thereof with the provisions of this section relating thereto, shall be guilty of a misdemeanor, and shall be fined not less than one thousand dollars, nor more than five thousand dollars and imprisoned not less than six months nor more than three years. Every person who sells or offers for sale any imported oleomargarine, or oleomargarine purporting or claimed to have been imported, not put up in packages and stamped as provided by this act, shall be fined not less than five hundred dollars nor more than five thousand dollars, and be imprisoned not less than six months nor more than two years.

Sec. 11. That every person who knowingly purchases or receives for sale any oleomargarine which has not been branded or stamped according to law, shall be liable to a penalty of fifty dollars for each such offense.

Sec. 12. That every person who knowingly purchases or receives for sale any oleomargarine from any manufacturer who has not paid the special tax, shall be liable for each offense to a penalty of one hundred dollars, and to a forfeiture of all articles so purchased or received, or of the full value thereof.

Sec. 13. That whenever any stamped package containing oleomargarine is emptied, it shall be the duty of the person in whose hands the same is to destroy utterly the stamps thereon; and any person who willfully neglects or refuses so to do shall for each such offense be fined not exceeding fifty dollars, and imprisoned not less than ten days nor more than six months. And any person who fraudulently gives away or accepts from another, or who sells, buys, or uses for packing oleomargarine, any such stamped package, shall for each such offense be fined not exceeding one hundred dollars, and be imprisoned not more than one year. Any revenue officer may destroy any empty oleomargarine package upon which the tax-paid stamp is found.

Sec. 14. That there shall be in the office of the Commissioner of Internal Revenue an analytical chemist and a microscopist, who shall each be appointed by the Secretary of the Treasury, and shall each receive a salary of two thousand five hundred dollars per annum; and the Commissioner of Internal Revenue may, whenever in his judgment the necessities of the service so require, employ chemists and microscopists, to be paid such compensation as he may deem proper, not exceeding in the aggregate any appropriation made for that purpose. And such Commissioner is authorized to decide what substances, extracts, mixtures or compounds which may be submitted for his inspection in contested cases are to be taxed under this act; and his decision in matters of taxation under this act shall be final. The Commissioner may also decide whether any substance made in imitation or semblance of butter, and intended for human consumption, contains ingredients deleterious to the public health; but in case of doubt or contest his decisions in this class of cases may be appealed from to a board hereby constituted for the purpose, and composed of the Surgeon-general of the Army, the Surgeon-General of the Navy, and the Secretary of Agriculture; and the decisions of this board shall be final in the premises.

Sec. 15. That all packages of oleomargarine subject to tax under this act that shall be found without stamps or marks as herein provided, and all oleomargarine intended for human consumption which contains ingredients adjudged, as hereinbefore provided, to be deleterious to the public health, shall be forfeited to the United States. Any person who shall willfully remove or deface the stamps, marks, or brands on any package containing oleomargarine taxed as provided herein shall be guilty of a misdemeanor, and shall be punished by a fine of not less than one hundred dollars nor more than two thousand dollars, and by imprisonment for not less than thirty days nor more than six months.

Sec. 16. That oleomargarine may be removed from the place of manufacture for export to a foreign country without payment of tax or affixing stamps thereto, under such regulations and the filing of such bonds and other security as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may prescribe. Every person who shall export oleomargarine shall brand upon every tub, firkin, or other package containing such article, the word "oleomargarine." in plain Roman letters not less than one-half inch square.

Sec. 17. That whenever any person engaged in carrying on the business of manufacturing oleomargarine defrauds, or attempts to defraud, the United States of the tax on the oleomargarine produced by him or any part thereof, he shall forfeit the factory and manufacturing apparatus used by him, and all oleomargarine and all raw material for the production of oleomargarine found in the factory and on the factory premises, and shall be fined not less than five hundred dollars, nor more than five thousand dollars, and be imprisoned not less than six months nor more than three years.

Sec. 18. That if any manufacturer of oleomargarine, any dealer therein, or any importer or exporter thereof shall knowingly or willfully omit, neglect or refuse to do, or cause to be done, any of the things required by law in the carrying on or conducting of his business, or shall do anything by this act prohibited, if there be no specific penalty or punishment imposed by any other section of this act for the neglecting, omitting, or refusing to do, or for the doing or causing to be done, the thing required or prohibited, he shall pay a penalty of one thousand dollars; and if the person so offending be the manufacturer of or a wholesale dealer in oleomargarine, all the oleomargarine owned by him, or in which he has any interest as owner, shall be forfeited to the United States.

Sec. 19. That all fines, penalties and forfeitures imposed by this act may be recovered in any court of competent jurisdiction.

Sec. 20. That the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may make all needful regulations for the carrying into effect of this act.

Sec. 21. That this act shall go into effect on the ninetieth day after its passage; and all wooden packages containing ten or more pounds of oleomargarine found on the premises of any dealer on or after the ninetieth day succeeding the date of the passage of this act shall be deemed to be taxable under section eight of this act, and shall be taxed, and shall have affixed thereto the stamps, marks, and brands required by this act or by regulations made pursuant to this act; and for the purposes of securing the affixing of the stamps, marks, and brands required by this act, the oleomargarine shall be regarded as having been manufactured and sold, or removed from the manufactory for consumption or use, on or after the day this act takes effect; and such stock on hand at the time of the taking effect of this act may be stamped, marked, and branded under special regulations of the Commissioner of Internal Revenue, approved by the Secretary of the Treasury; and the Commissioner of Internal Revenue may authorize the holder of such packages to mark and brand the same and to affix thereto the proper tax-paid stamps.

Approved August 2, 1886.

IMPORTANT RULING CONCERNING OLEOMARGARINE.

Treasury Department, Office of the Commissioner of
Internal Revenue, Washington, October 22, 1895.

To Collectors of Internal Revenue:

It having come to the notice of this department that certain manufacturers of oleomargarine, who export that product, encroach upon the law in the use of private trade-marks, brands, labels, picture illustrations, and other advertising and descriptive devices, placed upon the tin or other inner package devices for separating lumps of oleomargarine inside the manufacturers' original packages for exportation, the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, hereby establishes regulations as follows, under authority contained in section 16, act of August 2, 1886.

Hereafter no trade-mark, label, brand, picture illustration, or other advertising or descriptive device will be permitted to be used upon the tins or other inner package devices of manufacturers' original packages of oleomargarine for export, which, in anywise conceal the government brand "oleomargarine," required under section 16 of the act of August 2. 1886, to be branded upon all packages of oleomargarine for export.

No such trade-mark, label, brand, picture illustration or other advertising or descriptive device shall be placed upon the tins or other inner package devices in such juxtaposition to the government brand, "oleomargarine," as to overshadow or confuse that notice as to the nature of the contents of the tins or other inner package devices. Nor shall it be permitted to use upon such tins or other inner package devices any trademark, label, brand, picture illustration, or other advertising or descriptive devices, which in anywise indicates or is calculated to induce the belief that the contents are anything else than oleomargarine. The government brand, "oleomargarine," must stand conspicuously by itself.

No trade-mark, label, brand, picture illustration, or other advertising or descriptive device, prohibited as above, for use upon the tins or other inner package devices, shall, in any other form, be inclosed in the manufacturers' original package containing the tins or other inner package devices.

The use of the word "butterine," in branding tins or other inner package devices of oleomargarine is prohibited by law.

Section 2 of the act of August 2, 1886, prescribes that "butterine" shall be known and designated as "oleomargarine."

Under the foregoing instructions it will be seen that the use of any trade-mark, label, brand, picture illustration, or other advertising or descriptive device, representing a cow, or dairy farm, or in any other form indicating the contents of the tins, or any other inner package devices to be a product of the dairy, or calculated to induce the belief that it is such product, is inadmissible.

Advise the manufacturers that hereafter the employment of any trademark, label, brand, picture illustration, or other advertising or descriptive device, which has not first received the approval of this office, will be at their own risk.

Collectors will furnish manufacturers and exporters of oleomargarine in their respective districts with copies of these regulations immediately upon their receipt, and see that strict compliance is had with their provisions.

JOHN S. MILLER,
Commissioner.

JOHN G. CARLISLE,
Secretary of the Treasury.

NATIONAL FILLED CHEESE LAW.

An Act defining cheese, and also imposing a tax upon and regulating the manufacture, sale, importation and exportation of "filled cheese."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purposes of this act, the word "cheese" shall be understood to mean the food product known as cheese, and which is made from milk or cream and without the addition of butter, or any animal, vegetable, or other oils or fats foreign to such milk or cream, with or without additional coloring matter.

Sec. 2. That for the purposes of this act certain substances and compounds shall be known and designated as "filled cheese," namely: All substances made of milk or skimmed milk with the admixture of butter, animal oils or fats, vegetable or any other oils or compounds foreign to such milk, and made in imitation or semblance of cheese.

Sec. 3. That special taxes are imposed as follows:

Manufacturers of filled cheese shall pay $400 for each and every factory per annum. Every person, firm or corporation who manufactures filled cheese for sale shall be deemed a manufacturer of filled cheese. Wholesale dealers in filled cheese shall pay $250 per annum. Every person, firm or corporation who sells or offers for sale filled cheese in the original manufacturer's packages for resale, or to retail dealers as hereinafter defined, shall be deemed a wholesale dealer in filled cheese. But any manufacturer of filled cheese who has given the required bond and paid the required special tax, and who sells only filled cheese of his own production, at the place of manufacture, in the original packages, to which the tax paid stamps are affixed, shall not be required to pay the special tax of a wholesale dealer in filled cheese on account of such sales.

Retail dealers in filled cheese shall pay $12 per annum. Every person who sells filled cheese at retail, not for sale, and for actual consumption, shall be regarded as a retail dealer in filled cheese, and sections 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240, 3241, 3243 of the revised statutes of the United States are, so far as applicable, made to extend to and include and apply to the special taxes imposed by this section and to the persons, firms or corporations upon whom they are imposed: Provided, That all special taxes under this act shall become due on the 1st day of July in every year, or on commencing any manufacture, trade or business on which said tax is imposed. In the latter case the tax shall be reckoned proportionately from the first day of the month in which the liability to the special tax commences, to the 1st day of July following.

Sec. 4. That every person, firm or corporation who carries on the business of a manufacturer of filled cheese without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than $400 and not more than $3,000; and every person, firm or corporation who carries on the business of a wholesale dealer in filled cheese without having paid the special tax therefor, as required by law, shall, besides being liable to the payment of the tax, be fined not less than $250 nor more than $1,000; and every person, firm or corporation who carries on the business of a retail dealer in filled cheese without having paid the special tax therefor, as required by law, shall, besides being liable for the payment of the tax, be fined not less than $40 not more than $500 for each and every offense.

Sec. 5. That every manufacturer of filled cheese shall file with the Collector of Internal Revenue of the district in which his manufactory is located such notices, inventories and bonds, shall keep such books and render such returns of materials and products, shall put up such signs and affix such number to his factory, and conduct his business under such surveillance of officers and agents as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may by regulation require. But the bond required of such manufacturer shall be with sureties satisfactory to the Collector of Internal Revenue, and in a penal sum of not less than $5,000; and the amount of said bond may be increased from time to time, and additional sureties required, at the discretion of the collector or under instructions of the Commissioner of Internal Revenue. Any manufacturer of filled cheese who fails to comply with the provisions of this section or with the regulations herein authorized, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be fined not less than five hundred dollars nor more than one thousand dollars.

Sec. 6. That filled cheese shall be packed by the manufcaturers in wooden packages only, not before used for that purpose, and marked, stamped and branded with the words "filled cheese" in black-faced letters not less than two inches in length, in a circle and in the center of the top and bottom of the cheese; and in black-faced letters of not less than two inches in length in line from the top to the bottom of the cheese, on the side, in four places equidistant from each other, and the package containing such cheese shall be marked in the same manner, and in the same number of places, and in the same description of letters as above provided for the marking of the cheese; and all sales or consignments made by manufacturers of filled cheese to wholesale dealers in filled cheese or to exporters of filled cheese shall be in original stamped packages. Retail dealers in filled cheese shall sell only from original stamped packages, and shall pack the filled cheese when sold in suitable wooden or paper packages which shall be marked and branded in accordance with rules and regulations to be prescribed by the Commissioner of Internal Revenue with the approval of the Secretary of the Treasury. Every person who knowingly sells or offers to sell, or delivers or offers to deliver filled cheese in any other form than in new wooden or paper packages, marked and branded as hereinbefore provided and as above described, or who packs in any package or packages filled cheese in any manner contrary to law, or who falsely brands any package or affixes a stamp on any package denoting a less amount of tax than that required by law, shall upon conviction thereof be fined for each and every offense not less than fifty dollars and not more than five hundred dollars or be imprisoned not less than thirty days nor more than one year.

Sec. 7. That all retail and wholesale dealers in filled cheese shall display in a conspicuous place in his or their salesroom a sign bearing the words "Filled cheese sold here" in black-faced letters not less than six inches in length, upon a white ground, with the name and number of the revenue district in which his or their business is conducted; and any wholesale or retail dealer in filled cheese who fails or neglects to comply with the provisions of this section shall be deemed guilty of a misdemeanor and shall on conviction thereof be fined for each and every offense not less than fifty dollars and not more than two hundred dollars.

Sec. 8. That every manufacturer of filled cheese shall securely affix by pasting on each package containing filled cheese manufactured by him, a label on which shall be printed, besides the number of the manufactory and the district and State in which it is situated, these words: "Notice—The manufacturer of the filled cheese herein contained has complied with all the requirements of the law. Every person is cautioned not to use either this package again or the stamp thereon again, nor to remove the contents of this package without destroying said stamp, under penalty provided by law in such cases." Every manufacturer of filled cheese who neglects to affix such label to any package containing filled cheese made by him or sold or offered for sale by or for him, and every person who removes any such label so affixed from any such package, shall be fined fifty dollars for each package in respect to which such offense is committed.

Sec. 9. That upon all filled cheese which shall be manufactured there shall be assessed and collected a tax of 1 cent per pound, to be paid by the manufacturer thereof; and any fractional part of a pound in a package shall be taxed as a pound. The tax levied by this section shall be represented by coupon stamps; and the provisions of existing laws governing the engraving, issue, sale, accountability, effacement and destruction of stamps relating to tobacco and snuff, as far as applicable, are hereby made to apply to stamps provided for by this section.

Sec. 10. That whenever any manufacturer of filled cheese sells or removes for sale or consumption any filled cheese upon which the tax is required to be paid by stamps, without paying such tax, it shall be the duty of the Commissioner of Internal Revenue, within a period of not more than two years after such sale or removal, upon satisfactory proof, to estimate the amount of tax which has been omitted to be paid and to make an assessment therefor and certify the same to the collector. The tax so assessed shall be in addition to the penalties imposed by law for such sale or removal.

Sec. 11. That all filled cheese as herein defined imported from foreign countries shall, in addition to any import duty imposed on the same, pay an internal revenue tax of 8 cents per pound, such tax to be represented by coupon stamps; and such imported filled cheese and the packages containing the same shall be stamped, marked, and branded, as in the case of filled cheese manufactured in the United States.

Sec. 12. That any person who knowingly purchases or receives for sale any filled cheese which has not been branded or stamped according to law, or which is contained in packages not branded or marked according to law, shall be liable to a penalty of fifty dollars for each such offense.

Sec. 13. That every person who knowingly purchases or receives for sale any filled cheese from any manufacturer or importer who has not paid the special tax herein provided for shall be liable, for each offense, to a penalty of one hundred dollars and to a forfeiture of all articles so purchased or received, or of the full value thereof.

Sec. 14. That whenever any stamped package containing filled cheese is emptied it shall be the duty of the person in whose hands the same is to destroy the stamps thereon; and any person who willfully neglects or refuses so to do shall, for each such offense, be fined not exceeding fifty dollars or imprisoned not less than ten days nor more than six months.

Sec. 15. That the Commissioner of Internal Revenue is authorized to have applied scientific tests, and to decide whether any substances used in the manufacture of filled cheese contain ingredients deleterious to health. But in case of doubt or contest his decision in this class of cases may be appealed from to a board hereby constituted for the purpose, and composed of the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Secretary of Agriculture, and the decision of this board shall be final in the premises.

Sec. 16. That all packages of filled cheese subject to tax under this act that shall be found without stamps or marks as herein provided, and all filled cheese intended for human consumption which contains ingredients adjudged as hereinbefore provided to be deleterious to the public health, shall be forfeited to the United States.

Sec. 17. That all fines, penalties, and forfeitures imposed by this act may be recovered in any court of competent jurisdicton.

Sec. 18. That the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall make all needful regulations for the carrying into effect the provisions of this act.

Sec. 19. That this act shall go into effect on the ninetieth day after its passage, and all wooden packages containing ten or more pounds of filled cheese found on the premises of any dealer on and after the ninetieth day succeeding the date of the passage of this act, shall be deemed to be taxable under section 9 of this act, and shall be taxed, and shall have affixed thereto the stamps, marks, and brands required by this act or by regulations made pursuant to this act; and for the purpose of securing the affixing of the stamps, marks, and brands required by this act, the filled cheese shall be regarded as having been manufactured and sold or removed from the manufactory for consumption or use on or after the day this act takes effect; and such stock on hand at the time of the taking effect of this act may be stamped, marked, and branded under special regulations of the Commissioner of Internal Revenue, approved by the Secretary of the Treasury; and the Commissioner of Internal Revenue may authorize the holder of such packages to mark and brand the same and to affix thereto the proper tax-paid stamps.

Approved June 6, 1896.

INDIANA STATE DAIRY LAWS.

(From Thornton's Revised Statutes, 1897, page 351.)

"SELLING UNWHOLESOME MILK.—Whoever shall knowingly sell to any person or persons or sells or delivers or brings to be manufactured to any cheese or butter manufactory in this State, any milk diluted with water or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as "skimmed milk," or shall keep back any part of the milk known as "strippings" with intent to defraud, or shall knowingly sell milk, the product of a sick or diseased or injured animal or animals, or any milk produced from any cow fed upon the refuse of any distillery or brewery, or upon any substance deleterious to the quality of the milk; or shall knowingly use any poisonous or any deleterious material in the manufacture of any cheese or butter; or shall knowingly sell or offer to sell any cheese or butter in the manufacture of which any poisonous or deleterious substance has been used—shall be fined not more than five hundred dollars nor less than fifty dollars."

(Approved April 14, 1881. In force Sept. 19, 1881.)

"OLEOMARGARINE.—Whoever sells or has in his possession, with the intent to sell, or expose for sale, or whoever keeps on any table at any hotel, or at any public or private boarding house, any butter other than that made from pure milk, without first labeling the same in large letters, OLEOMARGARINE, shall be deemed guilty of a misdemeanor, and on conviction thereof, shall be fined not more than fifty dollars nor less than ten dollars."

(Approved and in force, March 3, 1883.)

AMERICAN DAIRY JOURNALS.

The publishers of these journals will no doubt gladly send copies to those who may apply for them.

American Cheese Maker, Grand Rapids, Mich. Monthly.
American Dairyman, New York City, N. Y. Weekly
Chicago Produce, Chicago, Ill. Weekly.
Creamery Gazette, Des Moines, Iowa. Monthly.
Creamery Journal, Waterloo, Iowa. Monthly.
Dairy World Chicago, Ill. Monthly.
Elgin Dairy Report, Elgin, Ill. Weekly.
Hoard's Dairyman, Fort Atkinson, Wis. Weekly.
Jersey Bulletin and Dairy Farmer, Indianapolis, Ind. Weekly.
Milk News, Chicago, Ill. Semi-Monthly.
New York Produce Review and American Creamery, New York City. Weekly.
Pacific Coast Dairyman, Tacoma, Wash. Semi-Monthly.
Practical Dairyman, Chatham, N. Y. Monthly
St. Paul Dairy Reporter, St. Paul, Minn. Weekly.

"These Bones Shall Rise Again."

PURDUE UNIVERSITY.

COMMERCIAL FERTILIZERS

H. A. HUSTON, State Chemist.
W. J. JONES, JR., Assistant.

SPECIAL BULLETIN, MAY, 1898.

The estimated sales of commercial fertilizers in Indiana during 1897 amounted to 49,400 tons. This is an increase of 7,400 tons on the estimated sales in 1896. As was explained last year, the apparent sales in 1896 are probably about 3,000 tons too low, so that the probable increase in 1897 is put at 4,400 tons. In the 49,400 tons for which tags were issued were 13,950 tons of bone and non-acidulated packing house products. 21,450 tons of "complete" fertilizer, that is, acidulated goods containing nitrogen, phosphoric acid and potash; 5,200 tons of ammoniated phosphates; 1,550 tons of acid phosphate and potash; 7,200 tons of plain acid phosphates and 50 tons of ground phosphate rock; of the bone and packing house products 1,200 tons had received an addition of potash.

Comparing the sales in each group with the sales of the previous year, we find that there has been an increase of 3,250 tons in the sales of bone and packing house materials, an increase of 2,800 tons in the sales of plain acid phosphate, an increase of 1,900 tons in the sales of ammoniated phosphates, an increase of 800 tons in the sales of bone and potash, a decrease of 250 tons in the sales of "complete" fertilizer and a decrease of 150 tons in the sales of acid phosphate and potash.

The amount of plant food contained in the fertilizers sold in 1897 includes 8,145 tons of actual phosphoric acid, of which 3,228 tons were in bone and packing house products, 3,926 tons were in the form of "available" in acidulated goods, and 991 tons were in the form of insoluble in acidulated goods.

In the plain acid phosphates the average per cent. of available phosphoric was 14.5, an increase of .7 over that of last year (13.8). Thirty-six different brands of acid phosphate were sold. Only two of these brands contained less than 10 per cent. available phosphoric acid, and eight brands contained over 16 per cent. Two brands that were sold in quite large quantities contained over 18 per cent. available. In the present condition of the retail fertilizer trade in this State very little difference is made in the price of an acid phosphate containing 12 per cent. available phosphoric acid and one containing 18 per cent. Yet the available phosphoric acid is the only thing in the goods which the farmer pays for. A ton of the 18 per cent. grade is worth one-half more than a ton of the 12 per cent. grade. One ton of the 18 per cent. grade contains as much fertilizing material as a ton and one-half of the 12 per cent. grade. The same remarks apply to the 10 and 15 per cent. grades, both of which are sold in quite large quantities. A grade containing from 8 to 10 per cent. available is sold to some extent. This is usually made by "filling" a high grade acid phosphate with some cheap material like ground shells or fine earth. The companies making them do not as a rule recommend them, but state that such brands are made to fill the demand for cheap or rather low priced goods. The price may be low, but such goods are not cheap, but as a matter of fact they are the dearest goods on the market. For if an acid phosphate containing 16 per cent. available phosphoric acid sells for $18 per ton, the farmer pays 5.6 cents per ton for his available phosphoric acid, while if he buys an 8 per cent. brand at $12 per ton, he pays 7.5 per pound for the same material in a somewhat less valuable condition. No sensible man would buy a mixture of half sand and half sugar at 4 cents per pound when he could buy pure sugar at 6 cents.

Fifteen tons of phosphoric acid were sold in the form of ground phosphate rock. This is practically all insoluble and very slowly available. Such goods have appeared from time to time on our market, but as they quickly disappear, it is presumed that buyers find them unprofitable, although they are "cheap."

The amount of nitrogen sold in fertilizers in 1897 was 964 tons, equivalent to 1,170 tons of ammonia. Nearly all of this was in the form of packing house products, although a few samples contained small amounts of nitrate of soda, tobacco stems and garbage products.

The amount of actual potash contained in the fertilizers sold in 1897 was 553 tons, or 9 tons less than in 1896. Comparing the year 1896 with 1897, the increase in tonnage of fertilzers sold amounts to 17.6 per cent. The increase in the amount of phosphoric acid contained in the fertilizers amounts to 44.3 per cent., the increase in nitrogen amounts to 9 per cent., and the decrease in potash to 1.6 per cent. These peculiar results arise from the marked increase in the sales of bone and high grade acid phosphate. This has also been the cause of a change in the ratios of the different plant foods to each other in the goods sold in 1897. In 1894 there were sold 7.3 pounds of phosphoric acid to every pound of nitrogen; in 1895 and 1896, 7.5 pounds, and in 1897, 8.4 pounds. In 1894 there were sold 12.8 pounds of phosphoric acid to every pound of potash; in 1895, 14.2 pounds; in 1896, 11.8 pounds, and in 1897, 14.7 pounds.

The actual amount of potash sold has remained practically constant for three years, although the tonnage of fertilizer sold has shown a marked increase. In 1895 and 1896, 60 per cent. of the brands contained potash, while in 1897 55 per cent. of them contained potash.

In view of the fact that the composition of the fertilizers sold in this State is subject to considerable variation from year to year, it is advisable for purchasers to examine carefully the composition of the goods which they buy. Every package of fertilizer that is legally on sale in this State bears a tag showing the State Chemist's analysis, which is the legal standard to which the goods should conform. From this tag purchasers can learn how much of each valuable ingredient the goods contain. Too often the purchaser is governed solely by the price per ton without regard to whether the goods contain the material that he wants, and without regard to the quantity of actual fertilizing ingredients in the goods. The result of this method of buying is that frequently the purchaser buys material that may be valuable in itself, but not needed by him, or that he buys low grade goods and pays more per pound for the material that he needs than is necessary. The aggregate loss to the farmers of this State from this loose method of buying represents a considerable sum that might be saved. A great part of this loss is to be charged to the practice of both local dealers and buyers of calling all fertilizers "bone dust." One of the earliest and best forms of fertilizers sold in this State was ground bone, and on this account the habit was formed of calling all by the same name. Often fertilizers that are as different in value and purpose as are a mowing machine and a self-binder are sold under the common term of "bone dust." The practice does not reduce the price of high grade goods, but serves to bolster up the price of the low-grade ones. No doubt the very long and senseless names that some manufacturers attach to their goods has also aided in keeping this expensive habit in vogue.

I have found that the retailer and the farmer are far more likely to talk in terms of 18, 22, 25 or 28 dollar "dust" than to say anything about the amounts of actual plant food in these goods. Another common way to refer to the goods is by the name of the manufacturer or by the trade mark, but very rarely by the name of a particular brand. Yet the firm name or trade mark may cover a dozen or more brands which range in real value between 15 and 30 dollars per ton. I have found that many general agents, who should post the retailer in regard to his goods, neither know nor care what sort of material is used in the manufacture of the goods they handle. Occasionally a traveling agent is well posted on the subject, but he is so rare, and his talk, which is sound and of real value, is so different from the usual agent's talk, that the well-posted man is quite apt to be taken for a bunco man by those used to the old style.

There is nothing so difficult about the matter but that an intelligent school boy may not learn enough about it in a few hours to enable him to buy fertilizers in a reasonable way. But so long as the absurd method of calling all sorts of different material by the same name continues so long may the farmer expect to pay too much per pound for actual plant food in low grade material. It ought not to take a buyer very long to figure out the difference in value between a bone containing 16 per cent. phosphoric acid and 2.5 per cent. ammonia and one containing 25 per cent. phosphoric acid and 4.5 ammonia. Yet he will not be likely to do so or to get the most value for his money if he merely starts out to buy some "dust."

TABLE OF FERTILIZERS LEGALLY ON SALE IN INDIANA, MAY, 1898.

Number.	NAME OF FERTILIZERS.	MANUFACTURERS.	Per Cent. Soluble Phosphoric Acid.	Per Cent. Reverted Phosphoric Acid.	Per Cent. Insoluble Phosphoric Acid.	Per Cent. Total Phosphoric Acid.	Per Cent. of Ammonia.	Per Cent. of Potash.	Estimated Value per Ton.	Number.
463	Zell's Calvert Guano	Zell Guano Co., Baltimore, Md.	9.19	2.01	1.42	12.62	1.00	1.43	$21.25	463
464	Zell's Electric Prosphate	Zell Guano Co., Baltimore, Md.	9.08	2.26	2.06	13.40	0.06	2.32	20.08	464
465	Zell's Dissolved Bone Phosphate	Zell Guano Co., Baltimore, Md.	13.27	2.01	0.00	15.28	0.06	0.00	18.34	465
577	XXX Phosphate	Cleveland Dryer Co., Cleveland, Ohio	8.70	5.02	3.74	17.46	0.00	0.00	16.46	577
578	Ohio Seed Maker	Cleveland Dryer Co., Cleveland, Ohio	6.15	3.24	4.17	13.56	2.04	0.00	21.77	578
579	Ammoniated Dissolved Bone	Cleveland Dryer Co., Cleveland, Ohio	6.12	3.74	4.34	14.20	2.10	0.00	22.71	579
581	Square Bone	Cleveland Dryer Co., Cleveland, Ohio	5.33	6.26	9.65	21.24	3.03	0.00	31.11	581
582	Superior Bone	Cleveland Dryer Co., Cleveland, Ohio	0.00	5.79	17.24	23.03	5.21	0.00	31.75	582
632	Bradley's Potato Fertilizer	Bradley Fertilizer Co., Boston, Mass.	4.98	4.47	4.30	13.75	2.83	4.20	29.34	632
633	Bradley's Niagara Phospate	Bradley Fertilizer Co., Boston, Mass.	4.72	3.15	2.75	10.62	1.77	1.32	19.56	633
634	Bradley's Dissolved Bone with Potash.	Bradley Fertilizer Co., Boston, Mass.	4.98	3.93	2.55	11.46	1.75	2.05	21.71	634
635	Dissolved Bone, Justice Brand	Bradley Fertilizer Co., Boston, Mass.	6.13	6.98	3.93	17.09	0.00	0.00	15.79	635
653	Pig Foot Bone	Southern Indiana Fer. Co., Boonville, Ind.	0.00	16.10	13.71	29.81	2.41	0.00	28.10	653
654	Premium Raw Bone Meal	Southern Indiana Fer. Co., Boonville, Ind.	0.00	8.57	17.68	26.25	5.02	0.00	33.44	654
664	Pure Raw Bone Meal	Nolte & Dolch Fertilizer Co., St. Louis	0.00	8.88	14.30	23.18	4.48	0.00	29.67	664
691	Economizer Phosphate	Zell Guano Co., Baltimore, Md.	7.18	3.93	2.17	13.28	1.14	1.42	21.98	691
719	Lister's U. S. Phosphate	Lister's Agr. Chem. Works, Newark, N. J.	8.62	2.65	1.29	12.56	2.44	3.36	27.90	719
727	Anchor Brand Complete Fertilizer	A. B. Mayer Mfg. Co., St. Louis, Mo.	0.14	4.16	6.37	10.67	5.05	2.65	28.17	727
746	Bradley's Triangle Bone and Potash	Bradley Fertilizer Co., Boston, Mass.	2.02	4.51	7.95	14.48	2.05	1.83	22.26	746
757	Buckeye Superphosphate	Cleveland Dryer Co., Cleveland, Ohio	6.24	6.45	3.61	16.30	3.15	0.02	29.41	757
875	Pure Raw Bone	Akin Fertilizer Co., Evansville, Ind.	0.00	6.16	14.64	20.80	3.96	0.00	26.44	875
904	Anchor Brand Wheat Grower	A. B. Mayer Mfg. Co., St. Louis, Mo.	1.34	1.75	11.23	14.32	3.79	0.23	22.71	904
911	Western Reserve Fertilizer	Newburg Fertilizer Co., Cleveland, Ohio.	5.49	2.63	3.02	11.14	1.68	1.24	19.71	911
999	Soft Bones	Robert Bausback, Shelbyville, Ind.	0.00	7.53	16.78	24.31	3.96	0.00	28.90	999
1031	Urbana Bone Meal	The Loudenback Fertilizer Co., Urbana, O.	4.11	5.95	2.93	13.00	1.35	0.72	30.37	1031

TABLE OF FERTILIZERS—Continued.

Number.	NAME OF FERTILIZERS.	MANUFACTURERS.	Per Cent. Soluble Phosphoric Acid.	Per Cent. Reverted Phosphoric Acid.	Per Cent. Insoluble Phosphoric Acid.	Per Cent. Total Phosphoric Acid.	Per Cent. of Ammonia.	Per Cent. of Potash.	Estimated Value per Ton.	Number.
1078	Zell's Dissolved So. Carolina Phosphate	The Zell Guano Co., Baltimore, Md........	12.50	1.89	1.24	15.63	0.35	0.00	21.94	1078
1083	Southern Ind. Fertilizer Co.'s Guano..	Southern Ind. Fert. Co., Boonville, Ind....	4.80	3.34	4.73	12.87	3.72	1.01	26.61	1083
1103	Urbana Sweepstakes Bone Phosphate..	The Loudenback Fertilizer Co., Urbana, O.	2.17	8.39	1.34	11.90	3.08	4.96	30.63	1103
1106	International Phosphate	Western Union Chem. Co., Cleveland, O..	7.55	7.58	1.73	16.86	0.00	0.00	18.16	1106
1124	Dissolved Bone and Potash	Southern Ind. Fert. Co., Boonville, Ind....	7.66	3.04	1.62	12.32	2.15	1.97	24.77	1124
1161	Lister's Animal Bone and Potash No. 2	Lister's Agr. Chem. Works, Newark, N. J.	8.05	2.24	0.86	11.15	0.00	2.72	18.19	1161
1170	Clover Lf. Br'd Pure R. B. & Tank M.	Dunn & Backer, Troy, Ind..................	0.00	7.86	14.64	22.50	4.91	0.00	30.48	1170
1178	Clover Leaf Brand Pure Raw Bone M'l	Dunn & Backer, Troy, Ind..................	0.00	8.42	18.32	26.74	4.40	0.00	31.92	1178
1181	Urbana Acidulated Bone	Loudenback Fertilizer Co., Urbana, O.....	11.46	4.11	1.15	16.72	0.00	0.00	18.68	1181
1237	Raw Bone Meal	J. B. Jones, Louisville, Ky.................	0.00	7.08	14.60	21.68	4.89	0.00	29.85	1237
1238	Ammoniated Bone Meal	J. B. Jones, Louisville, Ky.................	0.00	6.08	8.54	14.62	4.51	0.36	24.20	1238
1239	Kentucky Phosphate	J. B. Jones, Louisville, Ky.................	1.36	4.92	4.39	10.67	3.91	2.53	26.19	1239
1249	Zell's Amm'n'ted Bone Superphosphate	Zell's Guano Co., Baltimore, Md..........	8.19	2.65	0.99	11.83	2.89	3.12	28.18	1249
1326	M.E.Wheeler & Co.'s H.G. Pure G'd B.	M. E. Wheeler & Co., Rutland, Vt.........	0.00	11.93	21.21	33.14	1.56	0.00	27.88	1326
1327	M.E.Wheeler & Co.'s H.G. Elect.Dis.B.	M. E. Wheeler & Co., Rutland, Vt.........	9.29	3.96	1.04	14.29	0.00	0.00	15.90	1327
1328	M.E.Wheeler & Co.'s H.G.Roy.Wh.G'r.	M. E. Wheeler & Co., Rutland, Vt.........	6.79	2.09	0.38	9.26	1.50	2.35	19.98	1328
1329	M.E.Wheeler & Co.'s H.G. C'rn Fertil'r	M. E. Wheeler & Co., Rutland, Vt.........	6.40	1.81	1.19	9.40	2.47	2.17	22.22	1329
1330	M.E.Wheeler & Co.'s H.G.Gr's&OatsF.	M. E. Wheeler & Co., Rutland, Vt.........	8.64	3.13	0.73	12.50	0.00	2.19	19.54	1330
1331	M.E.Wheeler & Co.'s H.G. Potato Man.	M. E. Wheeler & Co., Rutland, Vt.........	7.10	1.89	1.14	10.13	2.77	3.14	25.35	1331
1341	Old Reliable Brand Spec'l Corn Grower	S. Kaufman & Sons, Indianapolis, Ind....	2.23	3.40	4.72	10.35	4.64	1.43	26.85	1341
1343	Pure Ground Raw Bone	The Zell Guano Co., Baltimore, Md........	0.00	7.24	14.09	21.33	4.67	0.00	28.94	1343
1401	Umbreit Bone Dust	Chas. Umbreit, New Albany, Ind..........	0.00	6.18	13.84	20.02	4.68	0.00	28.05	1401
1420	Empire Raw Bone Meal	Empire Carbon Works, St. Louis, Mo......	0.00	5.31	17.03	22.34	5.19	0.00	31.21	1420
1441	Urbana Animal Tankage and Guano....	The Loudenback Fertilizer Co., Urbana, O.	8.10	2.11	0.14	10.35	0.09	0.22	14.91	1441
1444	Old Reliable Br'd Spec'l Wheat Fertil'r	S. Kaufman & Sons, Indianapolis, Ind.....	2.46	3.31	4.75	10.52	4.59	1.41	26.39	1444

1467 Star Brand	Dryfus Pack. & Prov. Co., LaFayette, Ind.	0.00	3.08	5.04	8.12	10.40	0.56	37.56	1467
1472 German Phosphate	The Farmer's Fert. Co., Indianapolis, Ind.	0.96	5.42	10.06	16.44	2.75	4.25	28.32	1472
1479 Powter Brand	American Reduction Co., Pittsburg, Pa.	2.72	4.66	2.85	10.23	2.38	2.18	21.80	1479
1488 Anchor Brand Corn and Wheat Grower	A. B. Mayer Mfg. Co., St. Louis, Mo.	3.68	2.94	4.84	11.46	3.89	2.41	26.73	1488
1489 Bradley's Acid Phosphate	Bradley Fertilizer Co., Boston, Mass.	9.59	4.10	0.93	14.62	0.00	0.00	16.48	1489
1498 Powter's General Phosphate	American Reduction Co., Pittsburg, Pa.	3.36	6.85	1.41	11.62	3.40	2.81	28.71	1498
1500 D. & K. Wheat Fertilizer	Dockweiler & Kingsbury, Ind'polis, Ind.	4.06	4.01	9.17	17.24	3.28	1.47	28.25	1500
1503 Dissolved Bone and Potash	Marengo M'f'g Co., Marengo, Ind.	4.87	2.22	0.64	7.73	4.16	5.81	29.76	1503
1504 Slaughter House Bone	Marengo M'f'g Co., Marengo, Ind.	5.05	2.39	1.87	9.31	4.40	3.85	29.36	1504
1514 Raw Bone Meal	Marengo M'f'g Co., Marengo, Ind.	0.00	5.74	14.00	19.74	5.39	0.00	29.99	1514
1516 Niagara Queen City Phosphate	Niagara Fertilizer Works, Buffalo, N. Y.	10.18	2.19	0.88	13.25	0.00	0.00	14.84	1516
1517 Niagara Grain and Grass Grower	Niagara Fertilizer Works, Buffalo, N. Y.	5.67	1.50	4.10	11.27	1.78	1.53	19.52	1517
1518 Niagara Wheat and Corn Producer	Niagara Fertilizer Works, Buffalo, N. Y.	6.90	1.23	3.74	11.87	1.94	2.32	22.23	1518
1524 Half and Half	Marengo M'f'g Co., Marengo, Ind.	0.04	4.17	11.95	16.16	5.74	3.81	34.86	1524
1526 Standard A Brand	Standard Fertilizer Co., Boston, Mass.	4.18	3.90	2.37	10.45	1.15	1.70	18.22	1526
1527 Standard Guano	Standard Fertilizer Co., Boston, Mass.	5.39	3.66	2.16	11.21	1.30	4.10	22.79	1527
1528 Standard Ammoniated Dissolved Bone.	Standard Fertilizer Co., Boston, Mass.	3.68	7.07	3.90	14.65	1.97	3.47	27.46	1528
1529 Stand'd Dis'lv'd Bone Phosphate Lime.	Standard Fertilizer Co., Boston, Mass.	6.52	5:73	2.01	14.26	0.00	0.00	14.70	1529
1530 Standard Extra Fine Ground Bone	Standard Fertilizer Co., Boston, Mass.	0.00	2.45	13.62	16.07	2.52	0.00	18.81	1530
1531 Cumberland Extra Fine Ground Bone	Cumberland Bone Phos. Co., Boston, Mass.	0.00	2.43	13.52	15.95	2.43	0.00	18.46	1531
1532 Cumberland Dissolved Bone Phosphate	Cumberland Bone Phos. Co., Boston, Mass.	6.49	5.83	1.91	14.23	0.00	0.00	14.78	1532
1533 Cumberland Hawkeye Fertilizer	Cumberland Bone Phos. Co., Boston, Mass.	4.22	3.80	2.16	10.18	1.23	1.31	17.79	1533
1534 Cumberland Guano	Cumberland Bone Phos. Co., Boston, Mass.	5.27	3.90	2.06	11.23	1.09	4.09	22.25	1534
1535 Cumberland Ammon'ted Dis'lv'd Bone.	Cumberland Bone Phos. Co., Boston, Mass.	3.49	7.16	3.90	14.55	1.91	3.50	27.18	1535
1536 Bradley's Alkaline Bone	Bradley Fertilizer Co., Boston, Mass.	6.29	4.56	2.52	13.37	0.00	3.42	20.81	1536
1537 Bradley's Abattoir Bone Dust	Bradley Fertilizer Co., Boston, Mass.	0.00	2.79	14.35	17.14	2.74	0.00	20.22	1537
1542 Old Reliable Brand P. H. Bone	S. Kaufman & Sons, Indianapolis, Ind.	0.00	5.97	12.87	18.84	4.53	0.00	26.78	1542
1548 Pure Bone Meal	The Farmer's Fert. Co., Indianapolis, Ind.	0.00	7.23	22.73	29.96	2.47	0.00	28.38	1548
1561 D. & K. Crop Grower	Dockweiler & Kingsbury, Ind'polis, Ind.	0.00	8.63	11.21	19.84	3.86	1.90	27.75	1561
1562 Crocker's Ground Bone Meal	Crocker Fert. & Chem. Co., Buffalo, N. Y.	0.00	10.21	19.65	29.86	2.66	0.00	28.88	1562
1564 Crocker's Niagara Phosphate	Crocker Fert. & Chem. Co., Buffalo, N. Y.	10.94	2.11	0.04	13.09	0.00	0.00	15.66	1564
1566 Crocker's Superior Alkaline Bone	Crocker Fert. & Chem. Co., Buffalo, N. Y.	9.11	2.45	0.13	11.69	0.00	1.38	17.92	1566
1568 Crocker's Potato, Hop & Tob'co Phos.	Crocker Fert. & Chem. Co., Buffalo, N. Y.	8.44	1.95	0.77	11.16	2.52	3.42	26.67	1568
1571 Crocker's Am'd Wheat and Corn Phos.	Crocker Fert. & Chem. Co., Buffalo, N. Y.	7.75	2.51	1.28	11.54	2.46	1.96	24.86	1571
1582 D.&K. Q'ck Act'g Wh't & Corn Gr'w'r.	Dockweiler & Kingsbury, Ind'polis, Ind.	9.10	3.71	4.49	17.30	2.40	1.88	30.02	1582
1583 M.E. Wheeler&Co.'s High Gr. Fruit Fer.	M. E. Wheeler & Co., Rutland, Vt.	11.16	0.93	0.33	12.42	0.00	8.82	27.71	1583
1629 Beef, Blood and Bone	Virginia-Carolina Chem. Co., Richm'd, Va.	7.97	2.65	2.01	12.68	2.72	2.87	27.68	1629
1630 Virginia-Carolina Chemical Company's Dissolved Bone and Potash	Virginia-Carolina Chem. Co., Richm'd, Va.	5.49	5.17	0.23	10.89	0.00	3.46	19.21	1630
1631 Virginia-Carolina Chemical Company's Double Bone Phosphate	Virginia-Carolina Chem. Co., Richm'd, Va.	15.01	3.03	0.51	18.55	0.00	0.00	21.65	1631

TABLE OF FERTILIZERS—Continued.

Number.	NAME OF FERTILIZERS.	MANUFACTURERS.	Per Cent. Soluble Phosphoric Acid.	Per Cent. Reverted Phosphoric Acid.	Per Cent. Insoluble Phosphoric Acid.	Per Cent. Total Phosphoric Acid.	Per Cent. of Ammonia.	Per Cent. of Potash.	Estimated Value per Ton.	Number.
1632	Eureka High Grade Bone Phosphate..	Virginia-Carolina Chem. Co., Richm'd, Va.	11.55	2.60	0.38	14.53	0.00	0.00	16.98	1632
1648	V. E. Wampler's Grain Grower.........	V. E. Wampler, Dayton, Ohio.............	8.09	2.95	0.77	11.81	0.00	0.00	13.25	1648
1655	Darling's Ground Raw Bone............	Darling & Co., Chicago, Ill.................	0.00	7.62	17.07	24.69	4.90	0.00	31.98	1655
1656	Darling's Pure Ground Bone............	Darling & Co., Chicago, Ill.................	0.00	7.80	18.04	25.84	3.44	0.00	28.41	1656
1657	Darling's Farmer's Favorite Brand....	Darling & Co., Chicago, Ill.................	2.43	6.90	5.36	14.69	4.44	5.19	35.83	1657
1666	Urbana Animal Tank. & Guano No. 1..	The Loudenback Fertilizer Co., Urbana, O.	8.00	3.49	0.51	12.00	1.91	3.16	25.91	1666
1673	Half and Half	S. Kaufman & Sons, Indianapolis, Ind....	5.09	4.78	7.37	17.24	2.60	0.00	26.04	1673
1674	Soluble Bone and Potash..............	S. Kaufman & Sons, Indianapolis, Ind....	3.63	4.42	5.56	13.61	2.15	1.98	23.43	1674
1675	Bowker's Harvest Bone Dis. & Potash.	Bowker Fertilizer Co., Boston, Mass......	5.97	4.71	4.39	15.07	0.29	1.17	19.86	1675
1690	Bradley's Com. Man. for Pot's. & Vegs.	Bradley Fertilizer Co., Boston, Mass......	5.43	3.21	2.06	10.70	4.35	6.56	34.25	1690
1691	Ruby Phosphate	Jas. McCallum & Co., Dayton, Ohio........	8.96	4.78	4.45	18.19	1.53	0.00	26.50	1691
1692	Superior Pure Gr'd Bone with Potash..	Jas. McCallum & Co., Dayton, Ohio........	0.00	6.17	12.97	19.14	5.40	3.22	33.46	1692
1693	Miami Phosphate	Jas. McCallum & Co., Dayton, Ohio........	8.83	4.22	3.99	17.04	1.59	1.96	27.79	1693
1694	Ammoniated Dissolved Bone............	Jas. McCallum & Co., Dayton, Ohio........	7.00	4.27	4.14	15.41	2.63	3.51	30.36	1694
1695	Raw Bone and Phos. (Half and Half)..	Jas. McCallum & Co., Dayton, Ohio........	5.21	4.75	8.21	18.17	2.93	4.22	32.72	1695
1696	High Grade Tobacco & Potato Special.	Jas. McCallum & Co., Dayton, Ohio........	7.39	2.69	1.59	11.67	3.78	6.30	33.97	1696
1697	Spot Cash Fertilizer........................	Jas. McCallum & Co., Dayton, Ohio........	6.80	4.91	4.82	16.53	2.25	2.45	28.98	1697
1703	Ohio Valley Phosphate....................	G. S. Bartlett, Suc. Cincin'ti, O., Des. Co.	7.10	3.37	3.79	14.26	2.34	1.79	26.10	1703
1714	Anchor Brand Pure Bone Meal..........	A. B. Mayer M'f'g Co., St. Louis, Mo......	0.00	5.96	17.23	23.19	4.81	0.00	30.66	1714
1716	D. & K. Dissolved Bone and Potash...	Dockweiler & Kingsbury, Ind'polis, Ind...	3.25	2.77	5.56	11.58	2.15	2.42	21.12	1716
1717	Soft Bone	Charles E. St. John, Greensburg, Ind......	0.00	6.86	15.02	21.88	3.76	0.00	26.60	1717
1718	Increscent Brand Pure Fine Ground Bone	P. B. Mathiason Mfg. Co., St. Louis, Mo..	0.00	7.53	16.55	24.08	4.04	0.00	28.98	1718
1719	Increscent Brand Acidulated Pure Bone Meal	P. B. Mathiason Mfg. Co., St. Louis, Mo..	3.67	8.78	6.97	19.42	3.89	0.00	33.28	1719

1720	Increscent Brand Ammoniated Bone Meal	P. B. Mathiason Mfg. Co., St. Louis, Mo.	2.48	8.13	5.32	15.96	5.57	0.00	34.76	1720
1721	Increscent Brand Acidulated Bone with Potash	P. B. Mathiason Mfg. Co., St. Louis, Mo.	2.69	6.75	4.86	14.30	3.89	2.84	31.21	1721
1722	Increscent Brand St. Louis Phosphate	P. B. Mathiason Mfg. Co., St. Louis, Mo.	1.88	4.95	4.36	11.19	3.62	2.52	26.06	1722
1723	Increscent Brand Dissolved Bone	P. B. Mathiason Mfg. Co., St. Louis, Mo.	2.46	6.55	4.84	13.85	4.27	4.30	33.49	1723
1724	Lindley's Bone and Potash Wheat Grower	P. B. Mathiason Mfg. Co., St. Louis, Mo.	3.21	4.74	4.82	12.77	3.15	2.13	26.03	1724
1725	Fine Raw Bone Fertilizer	Robert Bausback, Shelbyville, Ind.	0.00	5.39	16.84	22.23	4.25	0.00	28.31	1725
1726	Cumberland Bone and Potash	Cumberland Bone Phos. Co., Boston, Mass.	6.60	4.56	0.75	11.91	0.00	2.57	19.16	1726
1727	Indian Brand Gilead Phosphate	G. S. Bartlett, Suc., Cin'ti, O., Des. Co.	4.22	3.83	5.87	13.92	3.23	2.16	27.07	1727
1728	Lister's Special Wheat Fertilizer	Lister's Agri. Chem. W'ks, Newark, N. J.	6.97	3.40	1.68	12.05	2.04	3.19	25.47	1728
1741	Bull Dog Phosphate	The West. Un. Chem. Co., Cleveland, O.	7.32	3.90	0.95	12.17	0.00	0.00	13.46	1741
1742	Common Sense	The Am. Reduction Co., Pittsburg, Pa.	2.01	2.58	2.52	7.11	3.57	1.96	21.00	1742
1745	Ammoniated Ground Bone	White River B. M'l Fert. Co., Seym'r, Ind.	0.00	6.12	11.41	17.53	6.97	0.13	33.34	1745
1746	Soluble Bone and Potash	Louisville Fertilizer W'ks, Louisville, Ky.	0.56	6.61	2.99	10.16	2.12	2.44	21.12	1746
1748	XXX Dissolved Bone	Read Fertilizer Co., Charleston, S. C.	11.09	3.02	0.91	15.02	0.00	0.00	16.93	1748
1749	Pure Raw Bone Meal	Walker Stratman & Co., Pittsburg, Pa.	0.00	8.04	15.68	23.72	4.36	0.00	29.68	1749
1750	Butcher's Bone Meal	Walker Stratman & Co., Pittsburg, Pa.	0.00	6.22	11.28	17.50	3.24	0.00	21.97	1750
1751	Helpmate Superphosphate	Walker Stratman & Co., Pittsburg, Pa.	7.55	3.47	0.96	11.98	0.00	0.00	13.22	1751
1752	Fourfold Fertilizer	Walker Stratman & Co., Pittsburg, Pa.	5.67	2.86	1.79	10.32	1.50	1.47	19.28	1752
1753	E. C. & D. Bone Phosphate and Potash	Ewing, Christmas & DeArmond, Greensburg	12.19	4.64	1.77	18.60	0.21	2.47	28.22	1753
1754	No. 1 Dissolved Bone	The Springfield Fert. Co., Springfield, O.	11.21	4.79	0.46	16.46	0.00	0.00	19.20	1754
1755	No. 4 Dissolved Bone	The Springfield Fert. Co., Springfield, O.	5.62	2.82	0.27	8.71	0.00	0.00	10.13	1755
1756	I. X. L. Ground Bone	The Springfield Fert. Co., Springfield, O.	0.00	1.57	11.45	13.02	2.69	0.00	17.18	1756
1757	Favorite Bone Phosphate	The Springfield Fert. Co., Springfield, O.	5.49	3.35	0.36	9.20	0.00	1.96	14.94	1757
1758	Atlas Bone Phosphate	The Springfield Fert. Co., Springfield, O.	6.27	3.18	1.32	10.77	2.07	2.91	23.74	1758
1759	Soluble Bone Phosphate	The Springfield Fert. Co., Springfield, O.	4.38	3.10	0.96	8.44	1.22	3.05	18.37	1759
1760	Illinois Zinc Co.'s Acid Phosphate	Illinois Zinc Co., Peru, Ill.	13.59	2.83	2.51	18.93	0.00	0.00	19.70	1760
1761	Soluble Bone	The South. Ind. Fert. Co., Boonville, Ind.	11.10	5.95	1.28	18.33	0.00	0.00	20.46	1761
1762	M. E. Wheeler & Co.'s H'g Gr. Pure Raw Bone	M. E. Wheeler & Co., Rutland, Vt.	0.00	7.21	15.51	22.72	4.83	0.00	30.39	1762
1763	Big One Pure Raw Bone	Nelson, Morris & Co., Chicago, Ill.	0.00	7.24	17.27	24.51	4.82	0.00	31.62	1763
1764	Big Two Pure Bone Meal	Nelson, Morris & Co., Chicago, Ill.	0.00	10.62	18.37	28.99	2.28	0.00	27.13	1764
1765	Big Three Bone Phosphate	Nelson, Morris & Co., Chicago, Ill.	0.00	5.11	5.91	11.02	5.84	0.27	25.56	1765
1766	Big Four Bone Phosphate, Bone, Blood, Meat, Potash	Nelson, Morris & Co., Chicago, Ill.	0.00	3.70	10.73	14.43	5.01	1.25	26.63	1766
1767	Phosphate Rock	E. F. Teeguarden, Liberty, Ind.	0.00	2.02	28.84	30.86	0.00	0.00		1767
1768	Corn and Wheat Grower	Louisville Fert. Works, Louisville, Ky.	3.56	6.71	1.84	12.11	1.29	2.90	22.88	1768

TABLE OF FERTILIZERS—Continued.

Number.	NAME OF FERTILIZERS.	MANUFACTURERS.	Per Cent. Soluble Phosphoric Acid.	Per Cent. Reverted Phosphoric Acid.	Per Cent. Insoluble Phosphoric Acid.	Per Cent. Total Phosphoric Acid.	Per Cent. of Ammonia.	Per Cent. of Potash.	Estimated Value per Ton.	Number.
1769	D. & K. Bone Phosphate	Dockweiler & Kingsbury, Ind'pls, Ind	8.14	4.32	0.64	13.10	0.00	1.11	19.16	1769
1770	D. & K. Fine Ground Bone	Dockweiler & Kingsbury, Ind'pls, Ind	0.00	7.90	23.00	30.90	2.76	0.00	29.91	1770
1771	Crocker's Prac. Am. Superphosphate	Crocker Fert. and Chem. Co., Buffalo, N. Y.	6.38	2.28	1.31	9.97	1.45	1.28	18.80	1771
1772	Crocker's General Crop Phosphate	Crocker Fert. and Chem. Co., Buffalo, N. Y.	5.01	1.86	0.78	7.65	1.52	1.48	16.42	1772
1773	Dissolved Bone	The Rasin Fertilizer Co., Baltimore, Md.	6.65	2.45	4.70	13.80	2.39	0.00	22.73	1773
1774	*Acid Phosphate or Dissolved S. C. Bone	The Rasin Fertilizer Co., Baltimore, Md.	10.77	2.84	0.64	14.25	0.00	0.00	16.33	1774
1775	Bone and Potash	The Rasin Fertilizer Co., Baltimore, Md.	9.13	3.17	0.99	13.29	0.00	2.08	20.31	1775
1776	†Ammoniated Alkaline Phosphate	The Rasin Fertilizer Co., Baltimore, Md.	5.85	4.21	2.07	12.13	1.51	1.11	21.19	1776
1777	§Ammoniated Superphosphate	The Rasin Fertilizer Co., Baltimore, Md.	5.16	4.46	3.06	12.68	2.08	1.35	23.16	1777
1778	Empire Guano	The Rasin Fertilizer Co., Baltimore, Md.	5.56	3.10	2.33	10.99	2.48	1.57	22.85	1778
1779	Hopkins' Old Time Phosphate	A. Hopkins & Co., New Albany, Ind	4.70	3.06	3.68	11.44	2.45	3.32	24.41	1779
1780	Crocker's New Rival Am. Superphos	Crocker Fert. and Chem. Co., Buffalo, N. Y.	8.49	1.55	1.05	11.09	1.82	2.01	22.56	1780
1781	Crocker's Universal Grain Grower	Crocker Fert. and Chem. Co., Buffalo, N. Y.	5.53	1.74	0.56	7.83	1.54	3.30	19.09	1781
1782	Crocker's Erie Fertilizer	Crocker Fert. and Chem. Co., Buffalo, N. Y.	9.35	1.76	1.62	12.73	0.00	0.00	13.33	1782
1783	Bone and Potash	The Jones Fertilizing Co., Cincinnati, O.	2.05	9.47	2.85	14.37	1.81	4.64	28.84	1783
1784	**Tobacco and Potato Grower	The Jones Fertilizing Co., Cincinnati, O.	5.00	2.78	1.66	9.44	4.31	8,29	34.77	1784
1785	Jones' Reliable	The Jones Fertilizing Co., Cincinnati, O.	2.80	3.01	4.27	10.08	1.78	2.04	18.48	1785
1786	††Miami Valley Phosphate	The Jones Fertilizing Co., Cincinnati, O.	2.03	4.62	4.08	10.73	2.98	4.22	25.76	1786
1787	Jewel Phosphate	The Jones Fertilizing Co., Cincinnati, O.	2.72	5.58	2.66	10.96	1.20	0.00	16.82	1787
1788	Acidulated Bone	The Jones Fertilizing Co., Cincinnati, O.	2.75	6.26	7.11	16.12	6.24	0.00	35.60	1788
1789	Ammoniated Bone Meal	The Jones Fertilizing Co., Cincinnati, O.	0.22	6.54	15.58	22.34	4.09	0.00	31.08	1789
1790	Fine Ground Bone	The Jones Fertilizing Co., Cincinnati, O.	0.00	7.41	15.25	22.69	4.49	0.00	29.35	1790
1791	Bone Meal	The Armour Fert. Works, Chicago, Ill	0.00	9.10	16.61	25.71	4.07	0.00	30.21	1791
1792	Acidulated Bone Meal	The Armour Fert. Works, Chicago, Ill	7.78	9.86	5.62	23.21	4.24	0.00	40.72	1792

1793	Raw Bone Meal	The Armour Fert. Works, Chicago, Ill.	0.00	8.45	18.68	27.08	5.20	0.00	34.56	1793
1794	Grain Grower	The Armour Fert. Works, Chicago, Ill.	8.80	3.82	2.39	15.01	3.46	2.15	32.06	1794
1795	Ammoniated Bone with Potash	The Armour Fert. Works, Chicago, Ill.	5.55	2.90	2.72	11.17	3.94	2.45	28.22	1795
1796	Acid Phosphate	The Armour Fert. Works, Chicago, Ill.	14.17	3.66	0.90	18.73	0.00	0.00	21.40	1796
1797	All Soluble	The Armour Fert. Works, Chicago, Ill.	6.78	6.09	3.28	16.15	4.50	6.20	40.98	1797
1798	Horse Shoe Brand Fine Raw Bone	Northwestern Fert. Co., Chicago, Ill.	0.00	6.04	17.17	23.21	4.87	0.00	30.86	1798
1799	Horse Shoe Brand Pure Ground Bone	Northwestern Fert. Co., Chicago, Ill.	0.00	8.22	13.84	22.06	4.58	0.00	29.18	1799
1800	Horse Shoe Brand Acidulated Bone	Northwestern Fert. Co., Chicago, Ill.	7.01	2.47	3.16	12.64	1.84	0.00	20.69	1800
1801	Horse Shoe Brand Nat. Bone Dust	Northwestern Fert. Co., Chicago, Ill.	4.86	3.30	1.60	9.76	3.42	0.92	23.75	1801
1802	Horse Shoe Brand Garden City Superphosphate	Northwestern Fert. Co., Chicago, Ill.	4.78	3.24	1.68	9.70	3.24	0.99	23.14	1802
1803	Horse Shoe Brand Chal. Corn Grower	Northwestern Fert. Co., Chicago, Ill.	4.89	3.16	1.62	9.67	3.45	0.98	23.77	1803
1804	Horse Shoe Brand Superphosphate and Raw Bone Mixture	Northwestern Fert. Co., Chicago, Ill.	2.99	5.26	6.15	14.40	4.38	0.70	29.07	1804
1805	Horse Shoe Brand $26 Phosphate	Northwestern Fert. Co., Chicago, Ill.	3.70	2.05	4.94	10.69	2.74	0.55	19.89	1805
1806	Horse Shoe Brand Prairie Phosphate	Northwestern Fert. Co., Chicago, Ill.	3.76	2.23	4.90	10.89	2.79	0.49	20.28	1806
1807	Horse Shoe Brand Ky-Ana Phosphate	Northwestern Fert. Co., Chicago, Ill.	4.70	2.36	2.28	9.34	1.92	0.31	17.38	1807
1808	Horse Shoe Brand Bone and Potash	Northwestern Fert. Co., Chicago, Ill.	9.13	2.47	2.56	14.16	0.00	1.17	19.18	1808
1809	Horse Shoe Brand Corn and Wheat Grower	Northwestern Fert. Co., Chicago, Ill.	6.04	3.12	2.83	11.99	2.70	1.64	24.59	1809
1810	Horse Shoe Brand Acidulated Bone and Potash	Northwestern Fert. Co., Chicago, Ill.	8.33	2.72	2.14	13.19	1.39	1.86	23.16	1810
1811	Horse Shoe Brand Dis. Bone and Phos.	Northwestern Fert. Co., Chicago, Ill.	7.16	3.37	2.57	13.10	1.84	0.00	21.80	1811
1812	Cumberland Potato Fertilizer	Cumberland Bone Phos. Co., Boston, Mass.	7.06	3.18	2.17	12.41	2.40	3.19	26.67	1812
1813	Darling's Sure Winner Brand	Darling & Company, Chicago, Ill.	1.88	7.65	5.37	14.85	2.68	3.56	28.81	1813
1814	Darling's Chicago Brand	Darling & Company, Chicago, Ill.	2.24	8.02	4.73	14.99	3.80	1.48	30.38	1814
1815	Universal Phosphate	The Farmer's Fert. Co., Ind'pls, Ind.	7.56	4.21	4.81	16.58	1.76	1.98	27.02	1815
1816	Half and Half	The Farmer's Fert. Co., Ind'pls, Ind.	6.43	3.79	5.32	15.54	3.83	0.00	28.99	1816
1817	Pure Raw Bone	The Farmer's Fert. Co., Ind'pls, Ind.	0.00	5.47	15.40	20.87	4.22	0.00	27.27	1817
1818	Tobacco and Potato Grower	The Jones Fertilizing Co., Cincinnati, O.	4.23	4.47	4.16	12.86	4.50	6.68	36.19	1818
1819	Miami Valley Phosphate	The Jones Fertilizing Co., Cincinnati, O.	3.07	5.65	6.00	14.72	4.36	3.01	32.50	1819
1820	Cincinnati Fert. Co.'s Pure Bone Meal	The Cincinnati Fert. Co., Cincinnati, O.	0.00	7.27	15.30	22.57	4.41	0.00	29.08	1820
1821	Cincinnati Fert. Co.'s Acidulated Bone Meal	The Cincinnati Fert. Co., Cincinnati, O.	2.69	6.71	6.51	15.91	6.29	0.00	35.94	1821
1822	Cincinnati Fert. Co.'s Pearl Phosphate	The Cincinnati Fert. Co., Cincinnati, O.	3.77	4.84	2.46	11.07	1.24	0.00	17.25	1822
1823	Cincinnati Fert. Co.'s Queen City Phosphate	The Cincinnati Fert. Co., Cincinnati, O.	2.94	5.67	6.10	14.71	4.34	3.02	32.36	1823
1824	Cincinnati Fert. Co.'s Indian Phos.	The Cincinnati Fert. Co., Cincinnati, O.	2.98	4.03	2.94	9.95	1.94	2.04	19.85	1824
1825	Dissolved Bone and Potash	The E. Rauh & Son's Fert. Co., Ind'pls.	8.94	2.84	2.78	14.56	2.19	3.42	28.83	1825
1826	Pure Ground Bone	The E. Rauh & Son's Fert. Co., Ind'pls.	0.00	6.47	15.30	21.77	4.36	0.00	28.32	1826
1827	Soluble Bone	The E. Rauh & Son's Fert. Co., Ind'pls.	9.98	3.44	2.88	16.25	1.20	1.99	26.43	1827
1828	Tripp Bros.' Bone Meal	Tripp Bros., North Vernon, Ind.	0.00	7.37	15.79	23.16	4.58	0.00	29.95	1828
1829	Tripp Bros.' Ammoniated Bone Meal	Tripp Bros., North Vernon, Ind.	0.26	6.73	15.35	22.34	4.50	0.00	32.50	1829

TABLE OF FERTILIZERS—Continued.

Number.	NAME OF FERTILIZERS.	MANUFACTURERS.	Per Cent. Soluble Phosphoric Acid.	Per Cent. Reverted Phosphoric Acid.	Per Cent. Insoluble Phosphoric Acid.	Per Cent. Total Phosphoric Acid.	Per Cent. of Ammonia.	Per Cent. of Potash.	Estimated Value per Ton.	Number.
1830	Tripp Bros.' Acidulated Bone Meal...	Tripp Bros., North Vernon, Ind............	2.66	6.72	6.97	16.35	6.38	0.00	36.45	1830
1831	Tripp Bros.' Diamond Phosphate......	Tripp Bros., North Vernon, Ind............	3.51	4.99	2.58	11.08	1.24	0.00	17.17	1831
1832	Tripp Bros.' Hoosier Phosphate........	Tripp Bros., North Vernon, Ind............	3.16	4.27	2.78	10.21	2.00	2.06	20.54	1832
1833	Tripp Bros.' Bone Phosphate	Tripp Bros., North Vernon, Ind............	2.69	7.24	6.23	15.16	4.39	2.88	32.87	1833
1834	Tripp Bros.' Bone and Potash..........	Tripp Bros., North Vernon, Ind............	3.94	4.82	4.26	13.02	4.69	6.64	36.86	1834
1835	Standard Special for Potatoes..........	Standard Fertilizer Co., Boston, Mass....	6.83	3.47	2.15	12.45	2.60	3.23	27.39	1835
1836	Standard Bone and Potash..............	Standard Fertilizer Co., Boston, Mass....	8.20	2.51	0.92	11.63	0.00	3.61	19.88	1836
1837	Ox Brand High Grade Dis. Bone.......	Tenn. Chemical Co., Nashville, Tenn......	12.73	2.92	0.90	16.55	0.00	0.00	18.78	1837
1838	Ox Brand Bone Potash	Tenn. Chemical Co., Nashville, Tenn......	6.38	7.05	1.05	14.48	0.00	1.14	20.80	1838
1839	Ox Brand Bone with Am. and Potash.	Tenn. Chemical Co., Nashville, Tenn......	8.15	4.58	1.09	13.82	1.46	1.42	24.56	1839
1840	Currie's Fine Ground Bone.............	The Currie Fertilizer Co., Louisville, Ky..	2.19	7.02	9.80	19.01	1.93	0.00	24.56	1840
1841	Currie's Butchertown Raw Bone Meal.	The Currie Fertilizer Co., Louisville, Ky..	6.29	4.48	6.08	16.85	2.55	1:79	28.52	1841
1842	Currie's Dissolved Bone.................	The Currie Fertilizer Co., Louisville, Ky..	8.06	3.04	2.05	13.15	1.19	3.14	24.11	1842
1843	Currie's Soluble Bone	The Currie Fertilizer Co., Louisville, Ky..	8.72	3.24	2.79	14.75	0.64	1.47	22.10	1843
1844	Currie's Spe. for Oats, Corn and Grass.	The Currie Fertilizer Co., Louisville, Ky..	7.98	3.37	2.25	13.60	0.94	2.71	23.31	1844
1845	Currie's Kentucky Phosphate...........	The Currie Fertilizer Co., Louisville, Ky..	8.93	3.30	2.62	14.85	0.64	1.51	22.48	1845
1846	Currie's Corn and Wheat Special.......	The Currie Fertilizer Co., Louisville, Ky..	8.29	3.85	3.51	15.65	0.42	0.89	21.43	1846
1847	Currie's Corn Grower....................	The Currie Fertilizer Co., Louisville, Ky..	8.78	3.04	2.75	14.57	0.67	1.55	22.07	1847
1848	Peerless Bone	The E. Rauh & Son's Fert. Co., Ind'pls...	0.35	5.07	5.01	10.43	6.91	4.72	36.99	1848
1849	§§Homestead Corn and Wheat Grower.	Michigan Carbon Works, Detroit, Mich....	6.42	3.57	1.43	11.42	3.05	3.20	27.83	1849
1850	Homestead Potato Grower	Michigan Carbon Works, Detroit, Mich....	7.28	2.24	0.92	10.44	2.91	6.13	29.97	1850
1851	Jarves' Drill Phosphate..................	Michigan Carbon Works, Detroit, Mich....	5.65	2.24	1.09	8.98	1.59	0.96	17.62	1851
1852	Red Line Complete Manure.............	Michigan Carbon Works, Detroit, Mich....	1.68	6.73	2.97	11.38	1.56	1.94	20.56	1852
1853	Red Line Phosphate with Potash......	Michigan Carbon Works, Detroit, Mich....	1.48	9.34	1.88	12.70	0.00	2.68	19.49	1853
1854	Red Line Ammoniated Phosphate.......	Michigan Carbon Works, Detroit, Mich....	5.97	2.25	2.85	11.07	2.22	0.00	19.88	1854

1855	Acid Phosphate	Michigan Carbon Works, Detroit, Mich.	5.10	8.24	1.65	14.99	0.00	0.00	16.01	1855
1856	Banner Raw Bone	Michigan Carbon Works, Detroit, Mich.	0.00	6.04	15.63	21.67	4.56	0.00	28.85	1856
1857	Desiccated Bone	Michigan Carbon Works, Detroit, Mich.	0.00	8.93	23.69	32.62	1.55	0.00	27.48	1857
1858	Globe Bone Dust	Globe Fertilizer Co., Louisville, Ky.	7.45	2.40	1.51	11.36	2.35	0.92	22.85	1858
1859	Globe Wheat Grower	Globe Fertilizer Co., Louisville, Ky.	8.96	1.84	1.54	12.33	3.00	2.07	27.51	1859
1860	Progress Phosphate Corn and Wheat Grower	Globe Fertilizer Co., Louisville, Ky.	7.78	1.83	1.55	11.16	2.49	1.45	23.59	1860
1861	Eagle Corn and Wheat Grower	Globe Fertilizer Co., Louisville, Ky.	8.84	1.88	1.64	12.36	2.83	2.04	26.93	1861
1862	Bone and Potash	Globe Fertilizer Co., Louisville, Ky.	10.75	3.01	0.58	14.34	0.64	1.49	23.32	1862
1863	Phosphate of Potash	Globe Fertilizer Co., Louisville, Ky.	8.87	1.43	0.61	10.91	0.51	4.69	21.94	1863
1864	Diamond Cereala Soluble Bone	Walton Fertilizer Co., Warren, O.	11.30	4.06	0.63	15.99	1.41	0.00	26.11	1864
1865	Special Dissolved Bone	Walton Fertilizer Co., Warren, O.	12.11	4.04	0.67	16.82	0.00	0.00	19.38	1865
1866	Diamond Bone Black and Potash	Walton Fertilizer Co., Warren, O.	10.95	3.64	0.56	15.15	0.00	4.94	26.69	1866
1867	Pure Bone with Potash	Walton Fertilizer Co., Warren, O.	0.00	2.83	13.10	15.93	3.21	1.29	22.33	1867
1868	Ontario Fish Guano with Potash	Walton Fertilizer Co., Warren, O.	6.22	3.78	4.52	14.52	3.38	4.22	31.92	1868
1869	Wheat and Grass Grower	Walton Fertilizer Co., Warren, O.	5.95	4.77	5.22	15.94	2.20	1.88	27.00	1869
1870	Acid Phosphate	Ohio Farmer's Fert. Co., Columbus, O.	5.76	3.87	0.67	10.30	0.00	0.00	11.56	1870
1871	Superior Phosphate	Ohio Farmer's Fert. Co., Columbus, O.	9.36	5.67	1.18	16.21	0.00	0.00	18.04	1871
1872	Grain and Grass	Ohio Farmer's Fert. Co., Columbus, O.	5.42	5.55	1.18	12.15	0.00	2.05	18.53	1872
1873	Corn, Oats and Wheat Fish Guano	Ohio Farmer's Fert. Co., Columbus, O.	5.64	3.62	1.91	11.17	1.50	5.30	24.97	1873
1874	Indiana Special	Ohio Farmer's Fert. Co., Columbus, O.	7.74	3.22	1.19	12.15	0.00	1.99	18.45	1874
1875	Acid Phos. or Dissolved S. C. Bone	The Rasin Fertilizer Co., Baltimore, Md.	10.25	4.57	0.95	15.77	0.00	0.00	17.78	1875
1876	Ammoniated Superphosphate	The Rasin Fertilizer Co., Baltimore, Md.	6.56	3.56	1.27	11.39	1.43	1.34	20.83	1876
1877	Ammoniated Alkaline Phosphate	The Rasin Fertilizer Co., Baltimore, Md.	5.64	3.72	3.01	12.37	1.97	1.55	22 68	1877
1878	Illinois Zinc Co.'s Acid Phosphate	Illinois Zinc Co., Peru, Ill.	13.75	4.05	0.78	18.58	0.00	0.00	21.36	1878
1879	Urbana Bone Phosphate and Potash	The Loudenback Fert. Co., Urbana, O.	6.95	3.75	2.26	12.96	1.48	2.58	23.87	1879
1880	Big Four Phosphate	Globe Fertilizer Co., Louisville, Ky.	6.40	1.84	0.59	8.83	1.37	1.02	17.22	1880
1881	Ground Bone	S. M. Hess & Bro., Philadelphia, Pa.	0.00	4.35	15.58	19.93	5.94	0.00	31.77	1881
1882	Ammoniated Bone Superphosphate	S. M. Hess & Bro., Philadelphia, Pa.	0.97	8.55	2.02	11.54	2.50	3.16	25.83	1882
1883	Soluble Bone	S. M. Hess & Bro., Philadelphia, Pa.	12.77	3.03	0.70	16.50	0.00	0.00	18.96	1883
1884	Wheat and Grass Manure	S. M. Hess & Bro., Philadelphia, Pa.	3.22	8.61	1.51	13.34	1.67	1.81	24.65	1884
1885	Potato and Truck Manure	S. M. Hess & Bro., Philadelphia, Pa.	3.56	5.14	1.24	9.94	3.77	5.61	30.97	1885
1886	Keystone Bone Phosphate	S. M. Hess & Bro., Philadelphia, Pa.	0.45	10.42	1.83	12.70	1.67	1.83	23.52	1886
1887	Armour's Phosphate and Potash	The Armour Fert. Works, Chicago, Ill.	5.48	5.77	5.13	16.38	0.00	2.41	21.72	1887
1888	M. E. Wheeler & Co.'s H. G. Wheat and C. Fertilizer	M. E. Wheeler & Co., Rutland, Vt.	9.07	3.12	0.65	12.84	0.00	2.34	20.26	1888
1889	Homestead Corn and Wheat Grower	Michigan Carbon Works, Detroit, Mich.	9.06	1.41	0.61	11.08	2.81	1.99	25.84	1889
1890	Bone Meal	The Rasin Fertilizer Co., Baltimore, Md.	0.00	8.16	17.94	26.10	3.49	0.00	28.74	1890
1891	Pure Ground Bone	The Jarecki Chemical Co., Sandusky, O.	0.00	6.14	16.12	22.26	6.06	0.00	33.76	1891
1892	C. O. D. Phosphate	The Jarecki Chemical Co., Sandusky, O.	13.16	2.69	1.20	17.05	0.00	0.00	19.02	1892
1893	Dissolved Bone Black Wheat Special	The Jarecki Chemical Co., Sandusky, O.	14.24	1.95	1.05	17.24	0.00	0.00	19.43	1893
1894	Bone and Phosphate Mixture	The Jarecki Chemical Co., Sandusky, O.	4.50	5.36	8.55	18.41	4.05	1.28	32.62	1894

TABLE OF FERTILIZERS—Continued.

Number.	NAME OF FERTILIZERS.	MANUFACTURERS.	Per Cent. Soluble Phosphoric Acid.	Per Cent. Reverted Phosphoric Acid.	Per Cent. Insoluble Phosphoric Acid.	Per Cent. Total Phosphoric Acid.	Per Cent. of Ammonia.	Per Cent. of Potash.	Estimated Value per Ton.	Number.
1895	Lake Erie Fish Guano	The Jarecki Chemical Co., Sandusky, O.	11.73	2.45	0.83	15.01	2.63	1.43	29.96	1895
1896	Double Fish Guano	The Jarecki Chemical Co., Sandusky, O.	10.95	2.74	0.74	14.43	3.47	1.86	32.25	1896
1897	No. 1 Fish Guano	The Jarecki Chemical Co., Sandusky, O.	10.81	2.93	1.22	14.96	1.02	1.37	24.67	1897
1898	Fish and Potash Grain Special	The Jarecki Chemical Co., Sandusky, O.	8.05	2.26	0.99	11.30	2.05	6.11	28.51	1898
1899	Fish and Potash Potato and Tobacco Food	The Jarecki Chemical Co., Sandusky, O.	8.06	2.20	0.93	11.19	2.06	6.03	28.34	1899
1900	O. K. Fertilizer	The Jarecki Chemical Co., Sandusky, O.	3.97	2.97	0.72	7.66	0.84	1.82	14.25	1900
1901	Iron City	The Am. Reduction Co., Pittsburg, Pa.	7.57	2.58	0.83	10.98	4.51	2.58	31.83	1901
1902	Fine Ground Bone	The Am. Reduction Co., Pittsburg, Pa.	0.00	9.65	14.30	23.95	4.48	0.00	30.12	1902
1903	Royal Bone Phosphate	Williams & Clark Fert. Co., New York and Cleveland	5.51	3.73	2.94	12.18	1.54	3.50	23.52	1903
1904	Prolific Crop Producer	Williams & Clark Fert. Co., New York and Cleveland	5.72	3.74	3.40	12.86	1.50	1.82	21.97	1904
1905	Good Grower Potato Phosphate	Williams & Clark Fert. Co., New York and Cleveland	5.44	3.69	3.15	12.28	1.46	3.20	22.89	1905
1906	Americus Dissolved Bone and Potash	Williams & Clark Fert. Co., New York and Cleveland	8.93	3.95	0.58	13.46	0.00	3.04	22.03	1906
1907	Acorn Brand Acid Phosphate	Williams & Clark Fert. Co., New York and Cleveland	8.90	3.60	0.61	13.11	0.00	0.00	15.00	1907
1908	Williams & Clark Dis. Bone Phos.	Williams & Clark Fert. Co., New York and Cleveland	7.15	3.12	0.50	10.77	0.00	0.00	12.82	1908
1909	W. & C. Carteret Ground Bone	Williams & Clark Fert. Co., New York and Cleveland	0.00	7.49	10.55	18.04	2.91	0.00	21.36	1909
1910	Uncas Bone Meal	The Quinnipiac Co., N. Y. and Cleveland	0.00	7.27	10.82	18.09	2.93	0.00	21.45	1910
1911	Plain Superphosphate	The Quinnipiac Co., N. Y. and Cleveland	7.05	3.25	0.68	10.98	0.00	0.00	12.36	1911
1912	Soluble Dissolved Bone	The Quinnipiac Co., N. Y. and Cleveland	8.74	3.79	0.75	13.28	0.00	0.00	15.04	1912

1913	Dissolved Bone and Potash	The Quinnipiac Co., N. Y. and Cleveland	9.08	3.56	0.69	13.33	0.00	3.04	21.76	1913
1914	Climax Phosphate	The Quinnipiac Co., N. Y. and Cleveland	5.68	4.02	3.17	12.87	1.58	1.82	22.41	1914
1915	Mohawk Fertilizer	The Quinnipiac Co., N. Y. and Cleveland	5.18	3.93	3.26	12.87	1.52	3.24	23.16	1915
1916	Bowker's Harvest Bone	Bowker Fertilizer Co., Boston, Mass	8.76	3.39	1.30	13.45	0.92	1.37	22.19	1916
1917	Bowker's Wheat Grower	Bowker Fertilizer Co., Boston, Mass	4.35	6.01	4.06	14.42	0.00	1.46	18.69	1917
1918	Bowker's Bone Meal	Bowker Fertilizer Co., Boston, Mass	0.00	5.04	20.09	25.13	2.27	0.00	24.40	1918
1919	Half Pure R. B. and Half Pure Bone Phosphate	The E. Rauh & Son's Fert. Co., Ind'pls	4.38	6.55	12.35	23.28	3.28	0.00	32.55	1919
1920	Pig Foot Bone	The E. Rauh & Son's Fert. Co., Ind'pls	0.00	6.30	16.32	22.62	4.33	0.00	28.82	1920
1921	Raw Bone	The E. Rauh & Son's Fert. Co., Ind'pls	0.00	5.86	20.49	26.35	4.56	0.00	32.13	1921
1922	Gold Coin Farmers' Favorite Phos	The E. Rauh & Son's Fert. Co., Ind'pls	11.01	2.85	2.78	16.64	2.65	3.29	32.97	1922
1923	Special Corn, Potato and Tobacco Fert.	The E. Rauh & Son's Fert. Co., Ind'pls	8.03	2.75	3.34	14.12	3.67	5.81	35.08	1923
1924	Competitor Fertilizer	Jas. McCallum & Co., Dayton O	7.38	3.59	0.40	11.37	0.00	0.40	16.08	1924
1925	Bowker's Dissolved Bone Phosphate	Bowker Fertilizer Co., Boston Mass	6.82	4.36	1.56	12.74	0.00	0.00	13.42	1925
1926	Bowker's Sure Crop Bone Phosphate	Bowker Fertilizer Co., Boston Mass	7.18	3.17	2.30	12.60	1.33	2.65	22.97	1926
1927	Bowker's Dissolved Bone Phosphate with Potash	Bowker Fertilizer Co., Boston Mass	4.39	5.83	4.12	14.34	0.00	1.45	18.52	1927
1928	Bowker's Ammoniated O. I. O. Phos	Bowker Fertilizer Co., Boston Mass	7.87	3.76	1.74	13.87	1.09	0.00	20.60	1928
1929	Acidulated Bone and Potash	The Loudenback Fertilizer Co., Urbana, O.	13.52	2.33	0.04	15.89	0.00	2.51	26.23	1929
1930	Raw Bone Meal	Swift & Company, Chicago, Ill	0.00	6.35	18.70	25.05	4.86	0.00	32.12	1930
1931	Ground Steamed Bone	Swift & Company, Chicago, Ill	0.00	8.70	17.91	26.61	8.66	0.00	29.61	1931
1932	Bone Tankage	Swift & Company, Chicago, Ill	0.00	7.11	11.50	18.61	6.23	0.00	31.86	1932
1933	Bone and Potash	Swift & Company, Chicago, Ill	0.00	8.72	16.12	24.84	3.37	3.35	31.52	1933
1934	Bone Tankage and Potash	Swift & Company, Chicago, Ill	0.00	6.27	9.89	16.16	6.46	1.61	32.62	1934
1935	Superphosphate	Swift & Company, Chicago, Ill	6.88	2.50	2.70	12.08	3.95	1.65	28.58	1935
1936	Potato and Tobacco Grower	Swift & Company, Chicago, Ill	6.45	3.16	3.22	12.83	3.73	5.00	32.58	1936
1937	Horse Shoe Brand Quick Acting Phos	Northwestern Fertilizing Co., Chicago, Ill.	14.35	2.31	0.38	17.04	0.00	0.00	19.99	1937
1938	Old Times Raw Bone Meal	A. Hopkins & Co., New Albany, Ind	0.00	8.32	14.84	23.16	4.10	0.00	28.51	1938
1939	Bone Meal	Milsom Rend. & Fert. Co.,E.Buffalo,N.Y.	0.00	8.09	15.86	23.95	4.22	0.00	29.43	1939
1940	Crocker's Animal Bone and Potash	Crocker Fert. & Chemical Co.,Buffalo,N.Y.	0.00	3.51	11.92	15.43	1.93	1.40	18.27	1940
1941	Fine Ground Bone Meal	Ohio Farmer's Fertilizer Co.,Columbus, O.	0.00	5.34	15.51	20.85	1.84	0.00	20.12	1941
1942	John W. Allen's Sure Crop	John W. Allen, Scottsburg, Ind	3.54	5.17	2.56	11.27	1.20	0.00	17.33	1942
1943	John W. Allen's Complete Fertilizer	John W. Allen, Scottsburg, Ind	2.07	3.98	5.32	11.37	3.17	2.18	23.79	1943
1944	Wheat, Oats and Barley Phosphate	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	9.38	0.91	0.09	10.38	1.88	2.62	23.24	1944
1945	Increscent Brand Extra Fine Bone	P. B. Mathiason M'f'g Co., St. Louis, Mo.	4.49	4.74	8.37	17.60	2.98	0.00	26.88	1945
1946	Pure Bone	S. Kaufman & Sons, Indianapolis, Ind	0.00	8.70	18.93	27.63	3.04	0.00	28.46	1946
1947	***Corn and Wheat Grower	J. & F. Schroth Packing Co., Cincinnati,O.	3.36	4.82	4.46	12.64	4.49	7.24	36.29	1947
1948	†††Schroth's Special	J. & F. Schroth Packing Co., Cincinnati,O.	4.08	3.02	4.03	11.13	2.20	6.29	26.51	1948
1949	Cyclone Bone	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	0.00	7.50	16.99	24.49	4.69	0.00	31.21	1949
1950	Dissolved Bone	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	11.56	1.27	0.05	12.88	0.00	0.00	15.40	1950
1951	Dissolved Bone and Potash	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	10.78	1.00	0.04	11.82	0.00	1.99	18.90	1951

TABLE OF FERTILIZERS—Continued.

Number.	NAME OF FERTILIZERS.	MANUFACTURERS.	Per Cent. Soluble Phosphoric Acid.	Per Cent. Reverted Phosphoric Acid.	Per Cent. Insoluble Phosphoric Acid.	Per Cent. Total Phosphoric Acid.	Per Cent. of Ammonia.	Per Cent. of Potash.	Estimated Value per Ton.	Number.
1952	Buffalo Guano	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	7.50	0.88	0.05	8.43	1.86	4.48	21.22	1952
1953	Buffalo Fertilizer	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	7.87	0.94	0.18	8.99	2.37	2.27	22.28	1953
1954	Corn Fertilizer	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	7.82	1.16	0.24	9.22	3.10	2.56	25.09	1954
1955	Erie King	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	7.55	0.96	0.17	8.68	1.45	2.49	19.35	1955
1956	Vegetable Bone Fertilizer	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	9.76	0.97	0.14	10.87	4.79	5.83	36.47	1956
1957	Potato, Hop and Tobacco Phosphate..	Milsom Rend. & Fert. Co., E. Buffalo,N.Y.	8.42	1.05	0.12	9.59	2.79	4.75	27.40	1957
1958	Corn and Wheat Grower	J. & F. Schroth Packing Co., Cincinnati,O.	3.33	5.49	4.71	13.53	4.66	4.76	34.87	1958
1959	Schroth's Special	J. & F. Schroth Packing Co., Cincinnati,O.	4.52	3.54	3.89	11.95	2.44	1.86	22.57	1959

*1774 Manufacturer claims error in sending sample, for later analysis see 1875

†1776 Manufacturer claims error in sending sample, for later analysis see 1877

§1777 Manufacturer claims error in sending sample, for later analysis see 1876

**1784 Manufacturer claims error in sending sample, for later analysis see 1818

††1786 Manufacturer claims error in sending sample, for later analysis see 1819

§§1849 Manufacturer claims error in sending sample, for later analysis see 1889

***1947 Manufacturer claims error in sending sample, for later analysis see 1958

†††1948 Manufacturer claims error in sending sample, for later analysis see 1959

EXPLANATION OF THE TABLE.

In the table the attempt is made to give the name and composition of every fertilizer on sale in the State at the date of printing this bulletin. Letters were sent to every manufacturer doing business in the State, asking them to furnish us with the list of brands that they would offer for sale here during the coming year. If any omissions are found in the table, it is because the manufacturers' replies to these letters have not been received.

The tables contain an "estimated value per ton." It is important to note what is intended by this. No attempt is made to state the agricultural value of the fertilizer or the return which a farmer may expect from a given quantity of any brand. The agricultural value would depend on many varying conditions, such as the crop to be raised, the composition and condition of the soil, the time and manner of applying the fertilizer, the amount of rainfall and sunshine, the temperature of the season, the drainage and other conditons.

The "estimated value per ton" is intended to mean the commercial value; that is, the sum for which a ton of the sample could be made and put on the market. The figures are only approximate and are probably rather above the selling price of the goods. In computing these valuations, the following values were given to the various ingredients:

In plain superphosphates—	
Available phosphoric acid	6 cents per pound.
Insoluble	nothing.
In acidulated mixed goods—	
Soluble phosphoric acid	7 cents per pound.
Reverted phosphoric acid	7 cents per pound.
Insoluble phosphoric acid	3 cents per pound.
In bone, tankage, etc.—	
Total phosphoric acid	3½ cents per pound.
In all goods—	
Ammonia	15 cents per pound.
Potash soluble in water	6 cents per pound.

In order to find the estimated value per ton the following simple rules may be observed:

In plain superphosphates—

Multiply $1.20 by the per cent. of soluble phosphoric acid.
Multiply $1.20 by the per cent. of reverted phosphoric acid.

Add together the numbers so obtained and the sum is the estimated value of a ton of the goods.

In acidulated mixed goods—

Multiply $1.40 by the per cent. of soluble phosphoric acid.
Multiply $1.40 by the per cent. of reverted phosphoric acid.
Multiply $0.60 by the per cent. of insoluble phosphoric acid.
Multiply $3.00 by the per cent. of ammonia.
Multiply $1.20 by the per cent. of potash.

Add together the numbers so obtained, and the sum is the estimated commercial value of a ton of the goods.

In bone, bone and potash, tankage, etc.—

Multiply $0.70 by the per cent. of total phosphoric acid.
Multiply $3.00 by the per cent. of ammonia.
Multiply $1.20 by the per cent. of potash.

Thus, suppose the tag on a plain acid phosphate shows the goods to contain

Soluble phosphoric acid	11.99 per cent.
Reverted phosphoric acid	3.92 per cent.

Then

$1.20×11.99=$14.39.
1.20× 3.92= 4.70

Estimated value per ton	$19.09

If the tag shows that the acidulated mixed fertilizer contained:

Soluble phosphoric acid	4.25 per cent.
Reverted phosphoric acid	5.50 per cent.
Insoluble phosphoric acid	2.02 per cent.
Ammonia	2.02 per cent.
Potash	2.23 per cent.

$1 40x4 25	$5 95
1 40x5 50	7 70
60x2 02	1 25
3 00x2 02	6 06
1 20x2 23	2 68
Estimated value per ton	$23 64

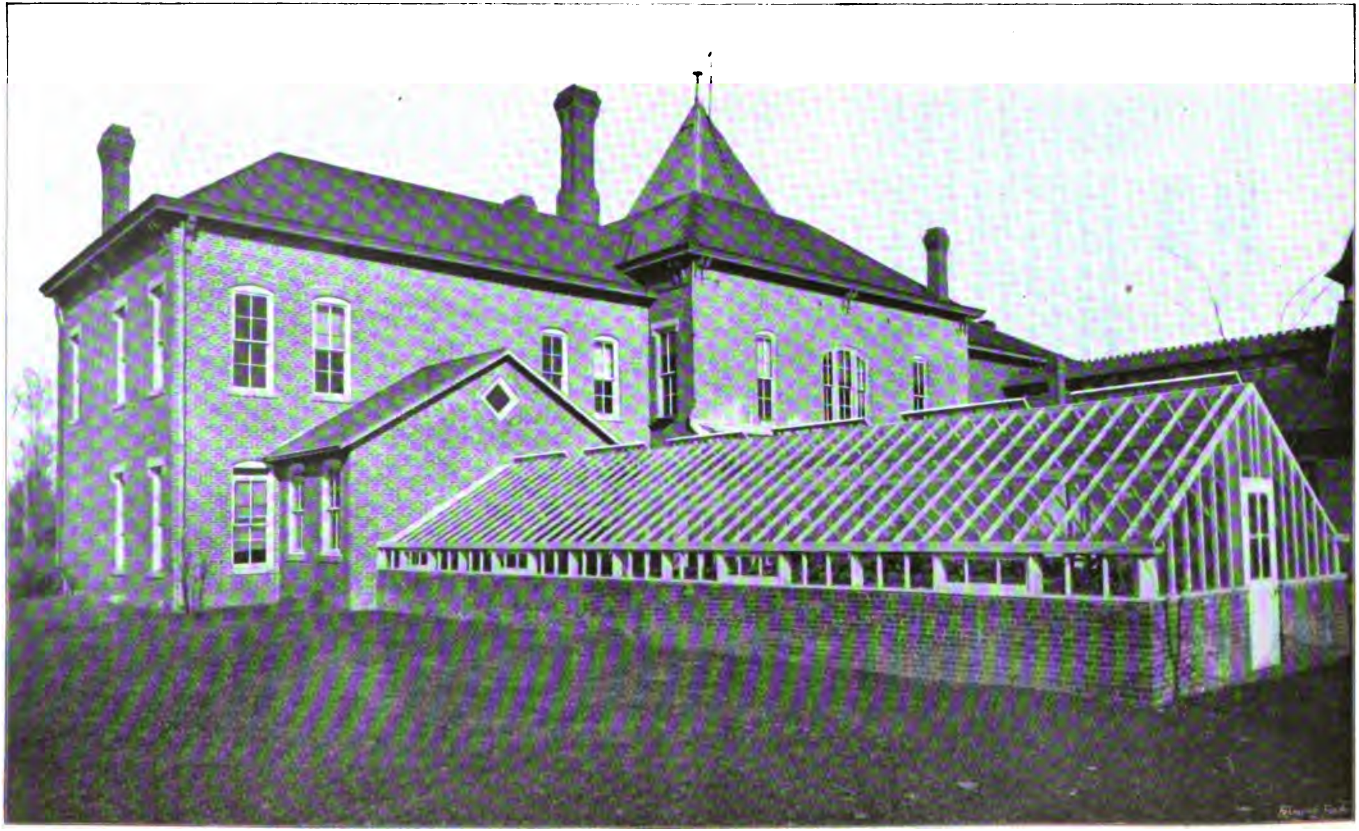
For a bone the sum of the phosphoric acid must be used. If the tag read:

"Reverted" phosphoric acid	5.22 per cent.
Insoluble phosphoric acid	16.22 per cent.
Ammonia	5.43 per cent.
The total phosphoric acid would be	21.44 per cent.

And the calculation would be—

$0 70×21 44	$14 91
3 00× 5 43	16 29
Estimated value per ton	$31 20

The legal standard of all fertilizers sold in Indiana is the analysis printed on the tag of the State Chemist attached to the sack. The indefinite "guaranteed analysis" sometimes printed on the sacks has no standing under the Indiana law. If there are no State Chemist's tags attached to the goods, the goods are not legally on sale, and no good citizen should become a party to the violation of a law intended to protect the rights of purchasers of fertilizers. Unless the goods have tags attached you have no legal guarantee that the goods contain any valuable fertilizer ingredients, and all dealers selling such goods are liable to heavy fines. Contraband goods are always open to suspicion.



GREENHOUSE OF HORTICULTURAL DEPARTMENT.

PURDUE UNIVERSITY

TENTH ANNUAL REPORT

OF THE

Agricultural Experiment Station.

LAFAYETTE, IND.

1897

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TENTH ANNUAL REPORT

OF THE

Purdue University Agricultural Experiment Station

REPORT OF THE DIRECTOR AND OTHER OFFICERS.

To President James H. Smart:

Sir—I have the honor to herewith transmit to you the Tenth Annual Report of the Purdue University Agricultural Experiment Station for the year 1897:

Experimental Work: No essential change in the character of the experimental work has taken place during the year, but investigations in certain lines have been intensified and given unusual prominence. In the Chemical Department the sugar-beet investigations have occupied a large amount of attention. The work of the past ten years in this direction has resulted in the Station being called upon for much information during 1897 on sugar-beet questions from the standpoint of both farmer and investor. Anticipating the demand for information concerning Indiana as a field for profitable beet-sugar production, the Station planned and carried out more far-reaching experiments than heretofore. Through the courtesy of the United States Department of Agriculture, 500 pounds of beet seeds were sent to us and distributed in certain localities in the State to farmers who agreed to grow one-fourth acre or more under Station directions. This work was delegated to the Chemist, who has had personal charge of the sugar-beet investigations from the first. As a result of this work, over 300 samples of beets were tested for sugar content this Fall from 23 different counties. The results of the tests made have already been transmitted to the Secretary of Agriculture at Washington, with whom we are cooperating in the work. A sugar-beet bulletin is now in preparation that will contain the results of the work of 1897, with some cultural instructions. This will be published early in 1898.

In connection with the sugar-beet work it is gratifying to be able to say that much territory in Indiana seems adapted to growing a beet rich in sugar. The Station tests have attracted much interest from both within and without the State, and in several counties, with headquarers at New Castle, Fort Wayne and Hamlet, sugar-beet associations have been formed, and efforts are in progress which it is hoped, will result in the creation of one or more beet-sugar factories in Indiana in the near future.

During 1898 the Station, in co-operation with the United States Department of Agriculture, will distribute a large quantity of beet seeds in certain parts of the State, where the adaptability of this root is yet untried.

Before closing this subject, I wish to call your attention to the fact that this Station has for years been publishing material on the sugar-beet, mainly as original investigations. This is shown in the following titles and when published. This list does not include numerous communications furnished agricultural or other journals:

Varieties of Sugar Beets. Bull. No. 18, January, 1889 p. 1.

Varieties of Sugar Beets. Bull. No. 31, April, 1890, p. 1.

Sugar Beets. Bull. No. 34, February, 1891, pp. 10.

Sugar Beets. Bull. No. 39, April 1892, pp. 10, pl. I.

Diseases of the Sugar Beet Root. Bull. No. 39, April, 1892, pp. 9, pl. I.

The Sugar Beet in Indiana. Bull. No. 43, March, 1893, pp. 16-20.

Sugar Beets. Bull. No. 49, March, 1894, pp. 15-40, figs. 2.

Sugar Beets. Bull. No. 55, March, 1895, pp. 46-54.

The Sugar Beet Question in Indiana. Newspaper Bull. No. 40, Dec. 19, 1896.

Sugar Beet Tests in Indiana. Newspaper Bull. No. 45, April 27, 1897.

Cultivation and Thinning of Sugar Beets. Newspaper Bull. No. 46, June 19, 1897.

The Sugar Beet as a Food for Live Stock. Newspaper Bull. No. 51, November 15, 1897.

Prepration of Ground for Planting Sugar Beets. Newspaper Bull. No. 52, November 22, 1897.

For some years, in both the Chemical and Botanical Departments of the Station, investigations have been made upon the edible fungi found in this region or of a cultivated class. In order to have a field for continuous investigation, in the Fall, a mushroom house was built for growing fungi for the Botanical Department. This was a plank cellar or pit, twenty feet long and eight feet wide, which is entirely covered with soil, and is so ventilated and constructed as to give a very uniform temperature within. It is hoped that this cellar will give satisfactory conditions for fungi studies.

In the Veterinary Department three lines of investigation are of more than passing importance. The subject of tuberculosis among cattle has within the year greatly increased in discussion, until finally it has resulted in the city of Indianapolis requiring all cows supplying milk to that city and within its boundaries to be tested with tuberculin and shown to be free from tuberculosis. The Veterinarian has been frequently in demand, and over 1,000 animals have been tested by the Station up to Jan. 1, 1898, while over 2,000 have been tested by Dr. Bitting or his deputy. The importance of this work is unquestioned, but beyond a desire to secure certain experimental data, I do not regard it as desirable for the Veterinarian to test herds on request, unless the work in question will be of widespread importance. There are plenty of veterinary surgeons competent to attend to such matters. It is gratifying, however, to know that the work of the Station in this field is being recognized and the services of the Veterinarian are in demand in the direction of improved live-stock conditions.

The source, distribution and suppression of hog cholera have also received much attention during the year in continuance of the study of 1896. At the request of Governor Mount, Dr. Bitting did some work along this line during his vacation, which was reported on very late in December. This investigation showed that the losses from hogs dying of cholera amount to $3,500,000 a year, and that much of this is due to improper water supply. On the recommendation of the Veterinarian, a bill was passed by the last Legislature regulating the disinfection of pens on fair grounds and the carrying of pigs from place to place in the State for exhibition, as it had been shown through figures presented by Dr. Bitting that cholera was extensively distributed through the agency of our fairs.

One other important investigation, which involves much original research, is a study of milk secretion and the mammary gland. This work has now been continued for over a year, in the veterinary laboratory, on horses and cattle and other domesticated animals, and considerable new information has been secured, which it is hoped will be published during 1898.

Following is given the principal subjects under investigation in the different departments of the Station:

I. CHEMICAL DEPARTMENT.

1. Sugar-beet culture in Indiana.
2. The composition of soils as affected by cropping.
3. The improvement of unproductive black soils.
4. Use of plant food on certain clay soils in southern Indiana.
5. Methods of soil analysis.
6. The composition of feeding stuffs.
7. Miscellaneous determinations.

II. BOTANICAL DEPARTMENT.

1. Influence of plant food on roses grown in pots and the open.
2. Potato scab and its treatment, especially by formalin.
3. Indoor lettuce culture.

4. Corn smut and its prevention by spraying.
5. The bacterial disease of the sugar beet.
6. The relation of size of seed to crop production.
7. Subwatering in the greenhouse.
8. Mushroom culture.
9. Cinerarias and calceolarias for greenhouse and decoration.

III. VETERINARY DEPARTMENT.

1. The distribution of hog cholera in Indiana and its prevention.
2. Testing hog-cholera remedies.
3. The mammary gland and the process of milk secretion.
4. Tuberculosis and the tuberculin test.
5. A study of the fecundity of breeds of swine.
6. The sanitary condition of drinking water for farm stock.
7. Sheep dips and their effect on parasites and wool.
8. Animal diseases in Indiana.

IV. HORTICULTURAL DEPARTMENT.

1. Close root pruning of fruit trees.
2. Whole vs. piece-root grafting.
3. The influence of climate on forest-tree seedlings.
4. New varieties of potatoes and methods of cutting.
5. A study of tomatoes as adapted to canning.
6. Testing varieties of fruit.
7. Greenhouse culture of lettuce and tomatoes.

V. AGRICULTURAL DEPARTMENT.

1. Field experiments on wheat, as involving—
    a. Test of varieties.
    b. Weight of seed.
    c. Distance apart of sowing in drills.
    d. The application of fertilizers, singly and in combination.
    e. Rotative cropping.
    f. Growing clover as an inter-crop each year.
    g. Effect of soil and climate on foreign varieties.
2. Field experiments on Indian corn, as involving—
    a. Depth of culture.
    b. Thickness of stand.
    c. Period of planting.
    d. The use of cultural implements.
    e. Rotative cropping.
    f. Influence of fertilizers in rotative cropping.
    g. Effect of planting in furrows.

3. Field experiments on oats, as involving—
    a. Tests of varieties.
    b. The adaptability of winter oats to northern Indiana.
    c. Fertilizer experiments.
4. Tests of grasses and forage plants.
5. Rotative cropping, as shown in corn, wheat, oats, clover and beets.

VI. ANIMAL INDUSTRY.

1. Feeding fattening pigs corn and wheat.
2. Feeding pigs corn meal and corn meal and shorts.
3. Feeding sheep rape in pasture.
4. Combinations of food for growing steers and dairy cows.
5. The relations of food consumption and milk and butter fat production in dairy cows.

Improvements.—A few much-needed improvements have been made during the year. The large cattle barn erected in 1889, the residence of the Director and Assistant Agriculturist and the wind pump house and derrick all received two good coats of paint. The old pig buildings, which were located in various lots, that were really unpresentable, were torn down, and neat, small pig houses erected, such as would serve as good models for feeding-lot shelters. What the Station now needs is a suitably constructed pig house for indoor winter feeding experiments. The present accommodations in this line are quite unsatisfactory and inconvenient.

Considerable new fencing was put up last spring, amounting to over 100 rods. Each year some of the old fencing has been replaced by new, until now nearly all of the Station grounds have been refenced and put in good condition, excepting that along the main highway extending west of the Farm House. This will require refencing early in 1898, as for several years it has been at the point of collapsing.

In December a new ten-horse power Van gas engine was purchased jointly by the University and Station and placed in the cattle barn to replace the old six-horse power steam engine and boiler. This new power, we hope, will prove a great addition to our equipment.

Publications.—The following are the publications of the Station for 1897. I may say that in addition to these, many agricultural contributions have been made to the press during the year by the writer and other members of the Station Staff:

PAMPHLET BULLETINS.

No. 64, vol. VIII, April, 1897, pp. 16. Field experiments with corn, oats and forage plants. By W. C. Latta and W. B. Anderson.

No. 65, vol. VIII, June, 1897, pp. 17-36, plates I, II. Formalin for prevention of potato scab. By J. C. Arthur.

No. 66, vol. VIII, October, 1897, pp. 38-58, Fig. 1, plates III, IV. Indoor lettuce culture. By William Stuart.

No. 67, vol. VIII, December, 1897, pp. 59-70. Wheat and corn as food for pigs. By C. S. Plumb and W. B. Anderson.

Ninth Annual Report of the Agricultural Experiment Station, 1896, pp. 61, Figs. 4, plates III.

NEWSPAPER BULLETINS.

The newspaper bulletins are but one-page size, and are distributed to some 650 Indiana periodicals and about 50 without the State. They are not sent to other parties and are issued from time to time as circumstances permit or demand:

No. 42. January 14, 1897. The San Jose Scale. (Aspidiotus perniciosus). By James Troop, Horticulturist.

No. 43. February 26, 1897. New remedy for potato scab. By J. C. Arthur, Botanist.

No. 44. March 11, 1897. Strawberries: Varieties to plant. By James Troop, Horticulturist.

No. 45. April 27, 1897. Sugar-beet tests in Indiana. By C. S. Plumb, Director.

No. 46. June 19, 1897. Cultivation and thinning of sugar beets. By H. A. Huston, Chemist.

No. 47. July 13, 1897. Hog cholera in Indiana. B. A. W. Bitting, Veterinarian.

No. 48. August 2, 1897. Test of varieties of wheat. Winter oats. By W. C. Latta, Agriculturist.

No. 49. October 12, 1897. The San Jose scale in Indiana. By James Troop, Horticulturist.

No. 50. October 27, 1897. The relation of consumers to producers of milk. By C. S. Plumb, Director.

No. 51. November 15, 1897. The sugar beet as food for live stock. By C. S. Plumb, Director.

No. 52. November 22, 1897. Preparation of ground for planting sugar beets. By H. A. Huston, Chemist.

Mailing List: The above periodicals are very widely scattered. The pamphlet bulletin is distributed, as a rule, to the entire mailing list, which now numbers 14,750 names. This list, however, is growing so rapidly that each new edition has to be printed in greater number than the previous ones. The newspaper bulletins are one-page sheets of about 450 words. The following table shows the size of the mailing list at the beginning of each year since 1893:

STATION MAILING LIST.

Number of Names on List.	*Jan. 18, 1893.*	*Jan. 4, 1894.*	*Jan. 10, 1895.*	*Jan. 1, 1896.*	*Jan. 1, 1897.*	*Jan. 1, 1898.*
People in Indiana	5,741	7,131	8,666	9,143	10,590	11,900
Indiana periodicals	635	668	653	625	660	650
People in other states	1,158	1,316	1,606	1,788	1,872	2,000
Periodicals in other states	83	91	86	92	76	80
Foreigners	26	51	61	77	91	105
Foreign periodicals	7	7	7	6	8	8
Total	7,650	9,264	11,079	11,731	13,297	14,750

Live Stock: In connection with the Station equipment I desire to call your attention to the amount of live stock on the farm. The general health of the stock has been most excellent, and there has been a gradual and gratifying increase in numbers and quality during the past few years. Nearly all of the stock is of our own breeding. The following is an inventory about December 31, 1897:

CATTLE.

	Short-horn.	*Hereford.*	*Jersey.*	*Holstein-Friesian.*	*Grades.*
Males, yearling or over	0	1	2	1	1
Females, yearling or over	2	3	7	2	1
Calves, males	0	1	1	1	1
Calves, females	0	1	3	0	0
Total, (28)	2	6	13	4	3

SHEEP.

	Rambouillet Merino.	*Shropshire.*
Ram, one year or older	1	1
Ram, lamb	0	1
Ewes, one year or older	7	5
Ewes, lambs	4	3
Wethers	2	0
Cross bred lambs	0	2
Total, (26)	14	12

SWINE.

	Poland China.	*Berkshire.*	*Chester White.*
Males, one year or over	0	0	1
Males, under one year	1	0	2
Females, one year or over	1	0	3
Females, under one year	0	1	3
Grades, females	0	0	8
Grades, barrows	0	0	4
Total (24)	2	1	21

Of the above animals, the swine and sheep are beginning to furnish quite useful material for experimental feeding, but the cattle are so uneven in age and so divided up into different breeds that, although very useful for class-room instruction, they do not offer the most desirable material for feeding experiments.

I herewith submit in connection with the above, brief reports of the work of the several Departments of the Station, as transmitted to me by the persons in charge.

Respectfully submitted,

C. S. PLUMB,
Director.

REPORT OF THE CHEMICAL DEPARTMENT.

To C. S. Plumb, Director:

Sir—The following is a summary of the work of the Chemical Department for the year 1897:

SUGAR BEETS.

The interest in the production of sugar beets has been far greater than in any previous year. Many applications for seed were received, and the prospect for an extensive and thorough test of the matter of raising beets seemed promising. It was therefore decided to conduct the tests on such a scale that both the quality of the beets and the kind of work required for the production of commercial beets would be demonstrated. As there seemed to be a probability that beet factories might be erected in the State in the near future, it was thought desirable to urge farmers to become familiar with raising beets under factory conditions, in order that they might be in a better position to consider contracts for raising beets for factory purposes, should such an opportunity arise. The wisdom of this policy became very evident as the season advanced. Before the close of the year beet contracts were presented to farmers in several sections of the State.

Five hundred pounds of beet seed were received from the United States Department of Agriculture. Nearly all of this seed was distributed to farmers who engaged to raise from one-fourth to one acre of beets and to follow working directions. The remainder of the seed was distributed to a number of farmers who were willing to raise smaller amounts. Seed was sent to 107 farmers in 23 counties. Most of the work was conducted in northern and central counties, where both soil and climatic conditions seemed more favorable.

The spring was wet and backward, and in some counties seed could not be planted until after June 1st. The severe drouth of August and September found the beets in most cases below normal size for the season. Yet, with these disadvantages very many good results, both in quality and yield, were obtained. In previous years less than one-third of those to whom seed was sent have reported results or sent samples. This year shows a marked improvement in this respect.

A large number of farmers who had obtained seed from other sources have asked the Station to make analyses of their beets, and in every case this has been done. Over 300 analyses have been made.

The work on the farm of the Experiment Station included, in addition to the testing of a number of commercial varieties, a further study of beets affected with bacterial disease and a set of special tests on very high-grade seed sent out by Dr. H. W. Wiley, Chemist, United States Department of Agriculture.

The results of the work this season have been very gratifying, and in all sections of the State that I have visited I have found that the work is highly appreciated by the people and that the press give the Station the most cordial support in its work on this subject. Three hundred and seven samples from 143 stations in 35 counties have been examined.

FERTILIZER EXPERIMENTS ON CLAY SOILS.

This season these experiments were continued, the land being in wheat. The weather conditions were very unfavorable and the crop in southern Indiana was below the average. The very heavy rains of early spring damaged the plats both by washing and compacting the soil. The crops were harvested and weighed, and, notwithstanding the very unfavorable conditions, enough facts were obtained to serve as an index to the more profitable application of fertilizers on such lands and to point out the methods to be used in further investigations along this line. The two most conspicuous points are the very marked benefits derived from slaked lime which had been harrowed in before planting the corn, which preceded the wheat, and the necessity of drilling the fertilizer with the wheat instead of broadcasting it, if any results comparable with ordinary field practice are to be obtained. The effect of the fertilizers in securing a stand of clover and timothy was very marked. No grass was to be seen on the unfertilized plats.

I think it advisable to continue this work. But the plan must be altered so as to permit the drilling of the fertilizers with the wheat. This will present some difficulties, unless quite large plats can be used. Yet the large expenditures made for fertilizers and the unscientific and often wasteful methods of purchasing them make it very desirable that actual demonstration of a more rational and economical method should be made.

EXPERIMENTS ON THE PREVENTION OF ROOT ROT.

This season the tests on this subject were tried on a more extensive scale. The results are as promising as last year. The test was applied to 100 trees. Although many good results have been secured in preventing the disease and in checking it on infested trees, the matter is so important that I believe that the work ought to be more fully developed and a fuller study made of the matter before coming to a decision. The extent of the apple interests and the serious loss caused by the disease will more than justify the slight expense involved.

LABORATORY STUDIES OF AVAILABLE PLANT FOOD IN WORN SOILS.

Work on this subject has been continued. The nitrogen contained in the humus extracted from the 20 old series plats that have been under continuous corn crop for 18 years has been determined and comparison data from adjacent land under rotation.

Two samples of Rothamsted soil, which have been under experimental treatment for 50 years, were also obtained. To these only the method for available phosphoric acid could be applied. The results, both absolute and relative, were such as to justify the belief that the method for the determination of available phosphoric acid in worn soils, which was worked out in this laboratory, is one that may be found of considerable value in soil investigations. The method differs radically from any others that have been proposed, in that alkaline solvents are used. Work of this character involves many tedious processes and much careful manipulation. The methods worked out by us have been tested on the principal types of soil with satisfactory results.

CHEESE.

Repeated efforts to find samples of filled cheese on the market have been made, but no such material has been found. The cheese that seems to have taken the place of it was tested by the pepsin method, but even after many days the material remained undigested. The pepsin solution is the same as that used for the digestion work in food examinations. On either ordinary or filled cheese the casein is liquefied in a few hours and the fat separates and rises to the surface. The cheap cheese that has taken the place of the filled cheese contains very little fat, and the casein seems to be in such a condition as to offer great resistance to digestive ferments.

FEEDING MATERIALS.

A number of feeding materials have been examined. The analyses of those that seem of interest follow:

Substances.	*Linseed Oil Meal. Per Cent.*	*Coarse Linseed Meal. Per Cent.*	*Linseed Meal. Per Cent.*
Moisture	7.42	7.42	3.86
Ether extract	2.64	1.46	3.13
Crude protein	39.25	39.50	42.00
Crude fibre	8.53	8.05	9.10
Crude ash	5.38	5.36	5.03
Nitrogen free extract	36.78	38.21	36.88
Total nitrogen	6.28	6.32	6.72
Albuminoid nitrogen	5.96	6.39	6.15
Amide nitrogen	0.32	.....	0.57

The three samples are low in oil, showing that they resemble new process meal in this respect. The fat is lower than the average in new process meal and the protein is higher than usual for this product.

COTTON SEED MEAL.

This sample was sent in for examination to see if it was adulterated with hulls:

	Per Cent.
Moisture	4.93
Ether extract	9.96
Crude protein	47.75
Crude fibre	4.69
Crude ash	6.43
Nitrogen free extract	26.24
Total nitrogen	7.64
Albuminoid nitrogen	7.45
Amide nitrogen	.19

The results show the meal to be of very good quality, somewhat below the average in fat and above the average in albuminoids.

SILAGE FROM CORN STOVER.

A quantity of corn stover that had been carried over winter was run through the silage cutter and moistened with water in the silo. The fermentation and rise of temperature were such as usually take place in the making of silage. On August 15 samples were drawn and analyses made. An analysis of ordinary corn silage made from sample drawn May 25 is also given. This silage was put up in the fall, using the whole corn plant:

	Stover Silage. Per Cent.	*Ordinary Silage. Per Cent.*
Water	81.01	83.77
Ether extract	0.29	0.45
Crude protein	1.34	2.23
Crude fibre	7.08	4.86
Crude ash	1.50	1.42
Nitrogen free extract	6.22	5.41
Total nitrogen	0.20	0.35
Albuminoid nitrogen	.16	.20
Amide nitrogen	.04	.15

The stock did not eat the silage from the stover as readily as the silage made in the usual way.

PURSLANE.

In September inquiries were received at the Station in regard to the feeding value of Purslane (Portulaca oleracea). A sample of the material was collected from the Station grounds on September 22d and submitted to analysis. The sample contained both blossoms and some matured seeds. The analysis is as follows:

	Per Cent.
Water	86.56
Ether extract	0.50
Crude protein	1.81
Crude fibre	2.12
Crude ash	2.23
Nitrogen free extract	6.49
Total nitrogen	0.29
Albuminoid nitrogen	0.23
Amide nitrogen	0.06
Phosphoric acid	0.045
Potash	0.85

The material compares favorably with average samples of corn fodder so far as the protein and ether extract are concerned. Nitrogen free extract is rather lower than in most green fodder, but the amount of water is considerably higher. The ash is higher than any ash that I have seen reported in green feeding stuffs. Owing to the relatively low amounts of fibre and nitrogen free extract, the nutritive ratio is high, being about 5.5. The material has been used to some extent in this State for many years as a food for pigs, and in many localities is highly esteemed. Analysis shows that it is well worth consideration as a feeding material for such animals as will eat it readily.

The material has also a relatively high fertilizing value. The nitrogen per cent. is relatively high compared with other weeds and the amount of potash is also relatively large. The amount of phosphoric acid present in the sample is somewhat small as compared with other weeds. The sample, however, grew upon lands to which no phosphate had been applied for a long time, and, as has been frequently noticed in the experiments of the Station, purslane responds very readily to applications of phosphoric acid; it is probable that upon lands containing more phosphoric acid the amount present in the plant would be somewhat higher. The fertilizing value of a ton of the dried material would be about $16.00, reckoning the nitrogen, phosphoric acid and potash at the rates usually applied to commercial fertilizers.

The weed is generally considered a bad one and hard to subdue and, if it can be made to serve either for the purposes of feeding or a green manure, it may become of considerable value to agriculture in the State.

RYE MIDDLINGS.

	Per Cent.
Moisture	7.61
Ether extract	2.34
Crude protein	13.62
Crude fibre	3.62
Ash	3.19
Nitrogen free extract	69.62
Total nitrogen	2.18
Albuminoid nitrogen	2.03
Amide nitrogen	0.15

I find but one analysis of this material on record. It differs from the above by having nearly twice as much ether extract and two per cent. less protein.

BUCKWHEAT MIDDLINGS.

	Per Cent.
Moisture	7.55
Ether extract	9.23
Crude protein	35.87
Crude fibre	4.02
Ash	6.25
Nitrogen free extract	37.08
Total nitrogen	5.74
Albuminoid nitrogen	5.52
Amide nitrogen	0.18

The material has nearly the same ratio of ingredients as old process oil meal, but is somewhat higher in both fat and protein than average oil meal. It is also much richer in these two ingredients than was any of the three samples of buckwheat middlings found in previous records.

IDAHO COFFEE PEA.

This is a species of Astragalus from Prof. C. P. Fox, of the Idaho Experiment Station.

	Per Cent.
Moisture	6.79
Ether extract	6.56
Crude protein	15.37
Crude fibre	2.47

	Per Cent.
Ash	3.28
Nitrogen free extract	65.53
Total nitrogen	2.46
Albuminoid nitrogen	2.32
Amide nitrogen	.14

The fat is much higher than is usual for leguminous plants, and the protein lower.

MALT SPROUTS.

Sample sent from Fowler, Ind.:

	Per Cent.
Moisture	5.55
Ether extract	1.54
Crude protein	27.07
Fibre	12.60
Ash	5.69
Nitrogen free extract	47.55
Total nitrogen	4.33
Albuminoid nitrogen	2.77
Amide nitrogen	1.56

The protein content is slightly above that recorded in previous analyses.

STRAW-BOARD WASTE.

A sample of straw-board waste was examined for fertilizer constituents. The material, as received, contained:

	Per Cent.
Water	69.67
Nitrogen	0.32
Phosphoric acid	0.21
Potash	0.14

The material would have only about one-third of the plant food found in barnyard manure. It would probably decompose slowly in the soil and is not of enough value to pay for hauling any considerable distance. It would probably be used to best advantage on clay land.

A sample of ashes said to be derived mainly from the bark of walnut, oak, etc., was found to contain 1.27 per cent. of potash. This would indicate that the material has been leached, as the amount of potash is less than that contained in ordinary wood ashes.

A sample of waste nitrate of soda from an acid factory was examined. It was practically all sodium sulphate. The nitrogen content was 0.56 per cent.

The sugar content of turnips was determined for the Botanical Department. The sample contained 0.66 sucrose and 4.95 per cent. dextrose.

In connection with a pig-feeding experiment at the farm, analyses of the wheat fed and of the whole grain that passed the pigs were made. With one lot of pigs the wheat was soaked, with the other lot the wheat was fed dry.

The analyses are reduced to water free basis:

Substances.	*Wheat as Fed.*	*Whole Grain in Manure.*	
		Soaked.	*Fed Dry.*
Ether extract	2.35	2.54	2.55
Crude protein	14.12	13.51	13.75
Crude fibre	3.01	3.49	3.21
Ash	2.30	3.01	2.39
Nitrogen free extract	78.19	77.44	78.10
Starch (by diastase)	61.45	60.75	58.06
Total nitrogen	2.26	2.16	2.20
Albuminoid nitrogen	2.22	2.10	2.16
Amide nitrogen	0.04	0.06	0.04

MARL.

Many beds of marl are found underlying the muck beds of the northern parts of the State. The analysis of a representative sample is here given.

	Per Cent.
Moisture	1.00
Insoluble in acid after ignition (sand, etc.)	2.47
Nitrogen	0.53
Silica	0.30
Oxides of iron, aluminum and manganese	1.32
Calcium oxide	44.80
Magnesium oxide	1.64
Potassium oxide	0.20
Carbon dioxide	36.74
Organic matter and undetermined	11.00

The material consists essentially of carbonate of lime and organic matter. The amount of nitrogen present is noteworthy. The condition of the organic matter would be improved by freezing. The material has considerable fertilizing value and would doubtless be of much value as an application to heavy lands. Only a trace of phosphoric acid is present.

Mr. J. M. Barrett has served as Assistant in an exceedingly satisfactory manner.

Very respectfully yours,
H. A. HUSTON,
Chemist.

REPORT OF THE BOTANICAL DEPARTMENT.

To C. S. Plumb, Director:

Sir—The work of the Botanical Department of the Station for the year 1897 has been a continuation of that of the previous year without serious interruption, there having been no change in the personnel of the department or in its policy. At the close of the previous year the rooms of the department were renovated and treated with paint, and an additional room provided, having 300 square feet of floor space, to be especially devoted to laboratory instruction. This improvement has added both to the convenience and the efficiency of the experimental work, by the partial withdrawal of students from the general laboratory, especially for the five months from January to May, inclusive, during which University classes in vegetable physiology, ecology and pathology receive instruction.* A general account of the equipment of the department was given in the report of last year, which remains equally applicable at the present time.

POTATO.

It is a matter for congratulation that the efforts of the department in the study of the potato scab, and especially the attempt to provide a cheap, safe and convenient remedy, have met with the most signal success. Experiments were begun in the greenhouse in the winter of 1895-6 and carried to completion in the field during the following summer, which led to the conclusion that formalin was an effective fungicide against scab, and, furthermore, that it met the above-named requirements of cheapness and convenience, and particularly of safety. What had been wanted was a remedy possessing the good qualities of corrosive sublimate. but without its deadly poisonous properties. Such a remedy has been found in formalin.

The results of the trials of 1896 were first published in a newspaper bulletin in February of the present year (1897), in order to give the farming public the benefit of the discovery in time to make it of service in the management of the year's crop. The full report of the experiments, which had been prepared at the close of the previous season, was not printed until June, and in a limited edition. Persons desiring it (Bulletin 65) are expected to make application to the Director of the Station. It will be sent to such persons prepaid and free of charge.

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*Much of the botanical instruction provided by Purdue University is given at the laboratories in Science Hall by Professor Stanley Coulter and his associates, especially in general, structural and systematic botany, histology, fermentation, bacteriology, and other special subjects.

The bulletin on "Formalin for Prevention of Potato Scab" (No. 65) consists of 20 pages and two plates, and gives the history of the subject, the results obtained at the Station, the results obtained by others, some account of the nature of formalin and specific directions for its use. It also discusses the relation of soil moisture to the increase of scab, and details an important method for the estimation of the injury to the crop.

The department carried on no tests of formalin during 1897, but hoped that it would be tried by many potato growers under sufficiently diverse conditions to gauge its value as a serviceable fungicide for general use. All reports so far received from growers agree in commending the remedy as meeting every reasonable requirement and fully affirming the good points claimed for it in the bulletin. Two letters are selected from the correspondence—one from Nebraska and the other from Massachusetts—which not only represent widely different sections of the country, but add some items of practical interest worthy of record.

Mr. B. B. Rice, of Grand Island, Neb., writes, under date of October 27, 1897, that he treated 21 bushels of Early Ohio potatoes. The seed tubers were "large, quite free from scab, having been selected from the scabby crop of last year." He purchased a one-pound bottle of formalin (1.25). Two barrels were used, and into each was put (by guess) 15 gallons of water and one-half the formalin. A bushel of uncut potatoes contained in a sack was dropped into each barrel, and after remaining a time, another bushel was put in, the same solution being used over and over until all were treated. The course of treatment was as follows:

One bushels in each barrel 3 times for 2 hours......	6 bushels
One bushel in each barrel 2 times for 2¼ hours.....	4 bushels
One bushel in each barrel 2 times for 2½ hours.....	4 bushels
One bushel in each barrel 2 times for 2¾ hours.....	4 bushels
Three-fourths bushel in each barrel 2 times for 3 hours	3 bushels
Total	21 bushels

He goes on to say (and this is a specially valuable contribution to the subject): "I could detect no difference in the amount of scab in the crop from seed treated first or last." He says, further: "I think now that the seed, although quite clean, should have been washed before it was placed in the solution, but I did not know it at the time the treatment was given. The 21 bushels were planted on four acres. One-third the field was well cared for; there the tubers were quite free of scab. The rest was very weedy and the potatoes a little more scabby. Yet on the whole the crop was not more than one-third as scabby as it was last year. The average yield was over 80 bushels per acre. I think your remedy is valuable and that it has benefited me, for the neighbor from whom I bought my seed a year ago did not doctor his potatoes last spring, and his crop this fall is very scabby—three times as bad as mine. Both fields of potatoes were planted in fresh soil—land not previously used for potatoes."

The other letter from which I wish to quote was received from Mr. Frank H. Goodhue, of North Andover, Mass., dated December 18, 1897. He writes: "The land I used for the experiment, about three-fourths of an acre, had been in mowing for 13 consecutive years. I broke the sod about nine inches deep, then harrowed thoroughly, furrowed three feet apart and put seed about one foot apart in the hills.

"I used 800 pounds Stockbridge potato fertilizer and 500 pounds Standard potato fertilizer, but used no stable manure. I put a large handful of fertilizer in each hill, mixed it thoroughly with the soil, then dropped the seed, covering it with about two inches of soil, scattered another handful of fertilizer over it, and finished off with some more soil. In order that the fertilizer might not cause the tubers to vary, the same kind was used on treated and untreated seed of each variety.

"The land was nearly level, only a slight rise on the west side; soil moist, but not wet. As far as moisture was concerned, the soil was alike on both treated and untreated seed. There was not a tree or building near the field to interfere.

"I planted four bushels each of Somerset and Rose Standish and also a few potatoes of Early Harvest and Early Fortune, and also some of Dandy and Old Merino, one-half of each variety being treated with formalin. The smaller lots were subjected only two hours to formalin, but the Somerset and Rose Standish were treated three hours. All of the seed was nearly free from scab. In order to be as accurate as possible, I put only three rows of untreated seed between the rows of treated seed.

"The seed was treated, then dried and planted about a week after treatment. Being very busy, I did not empty the formalin for eight days after using, and on doing so I found two tubers of the Somerset variety in the bottom of the cask. I planted them along with the Rose Standish that were not treated, making two hills of them, so that I would know them at harvest time. When we came to them I dug them myself. They were large, smooth and the cleanest potatoes I have ever dug from the soil.

"All the treated seed produced clean, smooth and handsome tubers, with not a rotten one among them, while the untreated were rather inferior in size, with many tubers considerably scabbed, say one-third of the surface, and about 3 per cent. were rotten.

"I think, with eight ounces of formalin to 15 gallons of water, that four hours' treatment are better than two hours. I am also inclined to believe the remedy is to some extent a preventive for rot."

Both of these reports indicate the important character of this remedy and the ease of its application. As shown by Mr. Goodhue, the length of time the seed tubers are kept in the solution does not noticeably affect their growth, especially if they have not sprouted too much, and a longer immersion kills the germs of the scab disease more completely. It is probable that the repeated use of the same solution could not, as a rule, be safely carried so far as practiced by Mr. Rice, but a half dozen times might still give good results, if the tubers were free from dirt and the periods of immersion were sufficiently prolonged. The report of Mr. Goodhue is especially to be commended for the careful way in which the treated and untreated material were subjected to uniform conditions. It will be a most important point gained when cultivators generally learn to try new remedies and methods of all kinds with a control for comparison, as in this case.

LETTUCE.

Several crops of lettuce have been grown in the greenhouse of the department during the last two years, but the most important part of the work reached completion in 1897. The results have been embodied in a bulletin of 20 pages and two plates, prepared by the Assistant Botanist, Mr. William Stuart. This bulletin has been sent to those thought to be interested in the subject. It can be obtained by others upon application to the Director. A brief statement of the main facts, unaccompanied by tables, has been prepared and printed by the Station in a bulletin bearing date of October, 1897.

The results obtained embrace some important items for the cultivation of indoor lettuce. By the use of commercial fertilizers the yield of the benches was increased more than three and a half times, when properly combined and applied; but with injudicious use their application decreased the yield. A moderately thick planting was found, contrary to expectation, to produce a heavier crop per square foot of bench than thinner planting. The use of flower pots to secure a ball of earth around the roots when marketed, and also for convenience in handling, was found to invariably lessen the yield. A method of obtaining the advantages of the pot with only the slightest check to growth is recommended in the bulletin, based upon the result of the experiments. The crops obtained by methods considered commendable were of the highest market value in both amount and quality.

CORN.

Observations and studies of corn smut have been continued during the year. The inoculation of young plants in second leaf with formation of smut pustules was successfully accomplished during October in the greenhouse by spraying with germinating spores. All the results and facts obtained will eventually be brought together in a bulletin.

BEET.

Further researches into the nature of the peculiar sugar-destroying disease of the sugar beet, some account of which has already been published in Bulletin No. 39 (April, 1893), and there ascribed to a specific kind of parasitic bacteria, have been prosecuted, most of the work being done by Miss Clara Cunningham as a part of her University studies. The bacterial nature of the disease, a point which has been called in question, has been confirmed, and many details of the life history of the parasite have been worked out. Excellent photographs have been secured, showing clearly the characteristic appearance of diseased beets, which will be used to illustrate the next contribution to the subject.

ROSE.

The use of different commercial fertilizers in growing the rose for cut flowers has been continued from last year. The same plants that were used last year, having been wintered in a cold pit, were used again without repotting. Most of the cans received an additional amount of the same fertilizers used the preceding season, a few cans being reserved, however, for special treatment. The results of the season confirm in the main those of last year.

In order to test in the open field the results obtained in the vegetation house, a piece of ground was planted with 14 varieties of hardy and semi-hardy roses. They were from two-and-a-half-inch pots, twelve of each variety. Nothing of importance was learned the present season, however, as the plants did not become sufficiently well established to respond noticeably to the presence of fertilizers.

This set of experiments is especially under the charge of the Assistant Botanist.

CINERARIA.

The plants of this attractive flower, which had been brought into bloom in December, 1896, continued to fill the greenhouse to its full capacity through January, February, March and April with a rich and brilliant display of flowers. Many of the plants bore more than 300 flowers each, and as specimen plants or in mass were universally admired. About thirty ladies of the city were asked to co-operate with the Station in testing the adaptability of the plants to decorative purposes under ordinary household conditions. They received plants and cared for them as they thought best until no longer decorative, reporting upon the frequency of watering, amount applied, temperature of the rooms, extent of exposure to sunlight, time when the first flowers failed and time when the plant became unattractive. The trials resulted most satisfactorily, and, taken altogether, much data has been accumulated upon the method of handling the plant and its adaptability to household decoration, which it is hoped may be early embodied in a bulletin.

FOOD OF PLANTS.

Of all the problems in the physiology of plants, probably none so directly bears upon the methods and profits of intensive farming and high cultivation generally as the application of the soil of barnyard and commercial fertilizers for the purpose of supplying food for the growing crop. Great advance has been made since the days of Liebig, the great promoter of high-grade husbandry, in the profitable use of fertilizers and in a knowledge of the requirements of different crops, and yet the practice remains largely empirical.

An exact knowledge of the kinds of food required by each kind of plant, of the method of its assimilation and of the apportionment of it within the plant to the building up of the different organs, has been exceedingly difficult to acquire. From Roman days, when agriculture was held in such high esteem that it was considered a worthy subject for the pen of the greatest poets, until the present time, little of a fundamental character has been added to our knowledge of the subject by the open-field method. Field experiments properly follow, but cannot take precedence, in providing the initial facts upon which rational husbandry should find a sure foundation. A great impetus was given to the elementary study, when, in 1860, the modern method of water cultures was introduced, by which, among other things, the now well-known fact that the carbon of the plant is obtained from the air and not from the soil was first definitely established. Since then cultures in water, sand and artificial earths and in restricted amounts of soil, kept under conditions controlled by the experimenter, have yielded the most valuable additions to our knowledge.

With a view of promoting a better understanding of some of the questions connected with the food and food supply of plants, the department has carried on studies in pot and bench cultures since the erection of the vegetation house, in 1893. Oats, wheat, corn, potatoes, buckwheat, roses, lettuce and certain weeds have been used in the experiments. Some of the data, discussed from the commercial side, was recently presented in the lettuce bulletin, referred to above, but the bulk of the results yet remain unpublished. It is proposed to continue these studies, with the hope that they may add some facts of importance to exact knowledge, and in particular, furnish data for improved and more economical ways of increasing yield by means of fertilizers.

SIZE OF SEED.

Experiments have been instituted from time to time, and the results partly published, which have established beyond doubt that the larger seeds of any particular kind of plant give a larger crop than the smaller seeds, both being grown under the same conditions. The experiments are now being continued in a somewhat modified form to ascertain how far the increase can be expected to extend, by selecting the largest seeds from each successive generation. Peas and beans are used, an account being kept of the size of the seeds sown each time, and of the size of the resulting plant, as well as of the number and size of the resulting seeds. It is, in fact, an attempt to ascertain the law of increase in size when brought about solely by the selection of the largest seeds through a series of generations.

SUB-WATERING FOR GREENHOUSES.

Of the various factors influencing the growth of plants, none is of greater moment than the control of the water supply. It has been until recently almost an axiom in culture under glass that an atmosphere heavily charged with moisture was a prime essential to success. To secure this condition excessive watering and sprinkling of the surface was resorted to. The plants being grown in shallow benches or in pots often suffered for moisture in the soil about the roots when the surface soil and the atmosphere were excessively moist.

Most crops forced under glass, especially those belonging naturally to temperate climates, such as tomatoes, lettuce, radish, cauliflower, carnations, roses, chrysanthemums, etc., thrive best with a moderately moist and well-aerated soil and rather dry atmosphere. The last condition is especially needed to promote a rapid movement of water through the plant, by which the food materials taken from the soil are transported to the upper parts and made available for growth. In some cases the continued health of the plants depends upon the strength of this transpiration stream.

This method of sub-watering supplies moisture readily to the part of the soil where it is most needed; it keeps the soil friable and well aerated; it prevents the packing of the surface soil and retards the accumulation of weeds and slime; it promotes a drier atmosphere, especially in contact with the plants, and removes much of the danger of invasion by molds, rots and other fungous diseases by permitting the surface of the foliage to be kept dry, and in many ways it brings about cultural conditions better than those obtained by the old methods.

The crops grown with this system of watering are larger and of better quality than usually secured, and it is believed that the results of our trials, especially during 1897, warrant its recommendaton for commercial houses, although the first cost is considerable (13 cents per square foot in the trial bench at the Station). The system has been explained, with illustrations, in the bulletin on indoor lettuce (No. 66), previously referred to.

OUTSIDE STORAGE.

For several years the department was without suitable means of carrying tubers, bulbs and dormant plants through the winter. In the fall of 1896 an outside storage pit was constructed that has met the demands so fully that it is worthy of brief mention. There is nothing novel about the method, but its cheapness and efficiency are probably not generally recognized.

The pit consists of a cellar nine by fifteen feet, two-thirds sunken below the general surface of the ground, with five hot-bed sashes forming the north slope of the roof, and the rest of the roof and the sides banked with earth and layers of straw. A bulkhead entrance with inner door and extra banking of straw in the coldest weather kept the pit from freezing during the winter of 1896-7. The bench was formed by leaving a ledge of earth, and the roof and side supports were made from the roughest material. The total cost of the structure was very small.

Perle des Jardin and Kaiserin Augusta Victoria roses, altogether over 100 pots, were placed in the pit November 25 and were taken out April 1, every plant in excellent condition, many of them still retaining much of their foliage. A few potatoes were also stored in the pit, and were kept in perfect condition. It is again being used to its full capacity for the winter season of 1897-8.

This is a cheap and efficient means of winter storage, and its possibilities deserve to be kept in mind. The department could economically use a much larger pit than the present one, and the purpose to which it is put might profitably be much extended.

Respectfully submitted,

J. C. ARTHUR,
Botanist.

REPORT OF THE HORTICULTURAL DEPARTMENT.

To C. S. Plumb, Director:

Sir—The following is a summary of the work done during the past year in the Horticultural Department:

Owing to the absence of a greenhouse, all of the experimental work of this department has of necessity been carried on in the orchard and garden. During the past summer a greenhouse was built for the purpose of carrying on experiments in forcing fruits and vegetables. This house is 50 feet in length and 18 feet wide, with a span roof and glass partition in the center, and is so piped as to enable us to preserve a high temperature in one room and a low temperature in the other. In the one room will be grown such plants as tomatoes and cucumbers, while the other

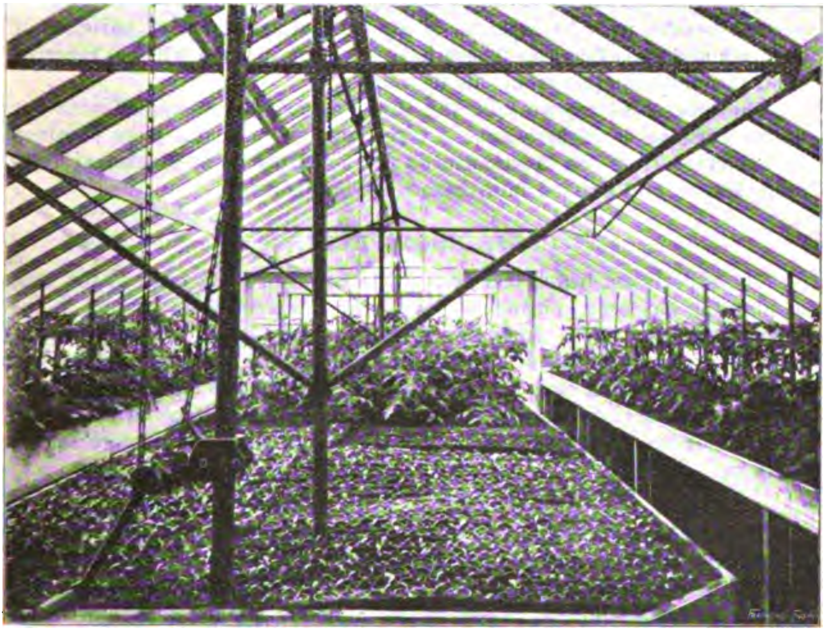

Fig. 1. Inside View of Greenhouse.

will be used as a combination insectary and lettuce-forcing house. Adjoining this house is a work room 12 by 18 feet, built of brick and fitted up with bins for soil and benches for the use of students in horticulture. The illustrations in the frontispiece and Fig. 1 of this report show an external and internal view of the house.

TESTING VARIETIES OF FRUIT.

The work of testing varieties, while not of the highest importance, is made necessary by the fact of so many varieties that are being constantly put upon the market. These varieties are sent to us for testing as to their fitness for a place among the older varieties; and in order to arrive at an intelligent conclusion, a considerable amount of time and space must be given to the work. During the past season there have been tested 86 varieties of strawberries, 28 varieties of raspberries and 16 varieties of blackberries, besides over 50 varieties of grapes and a number of varieties of currants and gooseberries. These have all been, or soon will be, reported upon through bulletins from this department.

The process of top-working the Russian varieties of apples with our native varieties is progressing. A large number of scions were obtained by exchange from the Horticulturist of the Experiment Station at Pullman, Wash., and grafted into these trees last spring.

CLOSE ROOT PRUNING.

The experiment begun last year of close-root pruning trees at the time of planting has been continued. Last year the trees were pruned in the spring and allowed to grow but a single season, with varying results, according to the varieties. In the fall of 1896 a row of two-year-old Wealthy apple trees was planted, each alternate tree being pruned, so that only about two inches of root remained, the balance being left in the natural condition. These will be left to grow two seasons before taking them up.

WHOLE VS. PIECE-ROOT GRAFTING.

In the spring of 1897 the Department of Agriculture sent us for testing nine varieties of Hungarian apple trees, three trees of each variety, grafted on whole roots, top cut and bottom cut. The varieties are as follows: Bottysui, Cillogos, Kechskemet, Magyar, Micholyfi, Noble Sovar, Nyaripiros, SeKula and Summer Wafer. These trees were planted in the orchard, where they are to remain for the purpose of studying the effect of all the various modes of grafting.

TESTING THE INFLUENCE OF CLIMATE ON FOREST TREE SEEDLINGS.

In the fall of 1896 this department received a large number of packages of forest tree seeds, representing 21 different States and Territories, from the Division of Forestry, Department of Agriculture, Washington,

D. C., with a request that these seeds be planted and careful notes taken, for the purpose of ascertaining the effect of climate on the seedlings thus produced. These seeds were planted last spring and a very good stand secured. The report for the first year has been filed with the Chief of the Division of Forestry. This very interesting experiment will be continued and a large number of additional varieties added next year, seeds of which have already been obtained.

NEW VARIETIES OF POTATOES AND METHODS OF CUTTING.

The following new varieties of potatoes were received during the spring for testing. They were planted in two-eye pieces and given ordinary field cultivation. Before the tubers were half grown, however, the drouth came on, and, as a result, the yield was cut down in some cases 50 per cent. or more, as shown by the number of small tubers at the time of harvest. Following is the yield of large and small tubers:

Variety.	*Bushels Per Acre. Large.*	*Bushels Per Acre. Small.*
Livingston	87.73	42.35
Uncle Sam	90.37	38.66
Early Michigan	136.12	58.23
Sir Walter Raleigh	222.64	
Bovee	212.96	38.72
Early Trumble	90.35	77.44
Andes	58.00	54.21
Country Gentleman	90.00	59.00
Early Thoroughbred (Maule's)	73.35	60.50

VARIETY.	How Cut and Number of Eyes to a Hill.	Bushels Per Acre. Large.	Bushels Per Acre. Small.
Beauty of Hebron	Four eyes in one piece	94.00	74.00
Beauty of Hebron	Four eyes in four pieces	90.30	86.80
Beauty of Hebron	Two eyes in one piece	90.60	53.00
Beauty of Hebron	Two eyes in two pieces	106.00	45.30
Beauty of Hebron	One eye in one piece	100.00	30.00
Beauty of Hebron	Seed end	48.40	40.00
Beauty of Hebron	Small, whole	96.40	75.60
Beauty of Hebron	Cut crosswise, upper half, seed end up	75.60	83.00
Beauty of Hebron	Cut crosswise, lower half, stem end up	81.60	95.30
Beauty of Hebron. Seed from Pennsylvania	Large, whole on a stem end	71.08	104.33
Second crop seed from Kentucky	Same as above	146.70	87.72

It will be seen that in a few cases the yield of small, unmarketable potatoes was actually larger than that of the marketable size, which was due, as has been said, to the dry weather. Another interesting fact is shown; that is, the lower half of the tuber, including the stem end, gave a larger yield of marketable tubers than the "seed end." Also, that the "second-crop seed" from Kentucky yielded 75 bushels per acre more of large tubers than the same variety, first crop, grown in Pennsylvania. This is partially due to the fact that the second-crop seed is from 10 to 12 days earlier than the other, so that more of the tubers were matured before the drouth commenced.

TOMATOES.

A large number of varieties of tomatoes were planted with a view of testing the relative value of each for canning purposes, but owing to the excessively dry weather the experiment was abandoned.

LIST OF SEEDS, PLANTS, INSECTICIDES, ETC., RECEIVED FOR TESTING.

Name of Plants.	*From Whom Received.*
Package Puget Sound Snowball cauliflower	H. H. Marsh, Fidalgo, Wash.
Package Early Erfurt cauliflower	H. A. Marsh, Fidalgo, Wash.
Clark blackberry	M. Crawford, Cuyahoga Falls, Ohio.
New winter radish No. 98	W. Atlee Burpee, Philadelphia, Pa.
Danish Ball Head cabbage	
Mayflower tomato	
Leafless radish	
Australian brown onion	
New lettuce from Italy	
Golden Eagle muskmelon	
Asparagus pea	
Italian ice lettuce	
Kleckley Sweets watermelon	
Long yellow stump-rooted carrot	
Rose ribbed self-blanching celery	
New Pink Prizetaker onion	
Fordhook pickling cucumber	
Carter's Daisy pea	
New stringless green pod bush bean	
Early Winningstadt cabbage	John A. King, Coggshall, Essex, England.
Early York cabbage	John A. King, Coggshall, Essex, England.
Dwarf white celery	Dept. of Agriculture, Washington, D. C.
Philadelphia early turnip	
Beauty of the Parterre parsley	
Buckeye tomato	
Seedlings of Chinese persimmons	
Saunders' Early blackberry	John Saunders, Oakland City, Ind.
Early Red Globe Onion	G. G. Silbertson, W. Mitchell, Ia.
Early Trumble potato	E. Tulley, Penza, Ohio.
The Andes potato	H. C. Marsh, Muncie, Ind.
Sir Walter Raleigh potato	Peter Henderson, New York.

Name of Plants.	*From Whom Received.*
Bovee potato	Peter Henderson, New York.
Ridgeway strawberry	M. H. Ridgeway, Wabash, Ind.
Seedling raspberry No. 10	M. H. Ridgeway, Wabash, Ind.
Nine varieties Hungarian apples	Dept. of Agriculture, Washington, D. C.
The Hoosier strawberry	Ran Beuoy, Matthews, Ind.
"96" strawberry	Ran Beuoy, Matthews, Ind.
Moorhead raspberry	H. Mahan, Terre Haute, Ind.
The Stahelin strawberry	F. C. Stahelin, Bridgeman, Mich.
The Centennial apple	B. F. Albaugh, Covington, Ohio.
Several samples of insecticides and fungicides	Powell Fertilizer and Chemical Company, Baltimore, Md.
1-pound can of Goodell's gray mineral ash	National Mining and Milling Company, Baltimore, Md.
3-gallon can of Roseleaf tobacco insecticide	The Spirit Cured Tobacco Company, Louisville, Ky.
Strawberry Runner cutter	The Carter Mfg. Co., Jackson, Mich.

The seeds were all planted, but owing to the exceedingly dry weather, the test was not considered a satisfactory one, and the results are not published. The plants will be reported upon next year. The insecticides and fungicides were all tested with good results. The rose-leaf tobacco extract is especially adapted for greenhouse work as a preventive of aphis and red spider, and as such it has proven very satisfactory.

Respectfully submitted,

JAMES TROOP,
Horticulturist.

REPORT OF THE VETERINARY DEPARTMENT.

To C. S. Plumb, Director:

Sir—Since making the last annual report no changes have been made in the apartments of the Veterinary Department nor apparatus added. The equipment has been ample for the work under consideration. The work has been directed along the following lines:

1. A study of the water supply for live stock in the State.
2. A continuation of the study of hog cholera.
3. A continuation of the study of tuberculosis.
4. A study of the treatment of contagious abortion among cattle.
5. A study of the fecundity of swine.
6. A study of the relative frequency of occurrence and distribution of diseases of stock in the State.
7. A study of sheep dips.
8. A study of the embryology, anatomy and physiology of the mammary gland.

WATER.

A study of the water supply for live stock in this State was conducted to determine the quality of water being furnished to stock and to determine the relationship, if any existed, between the water supply and disease. The work was divided into three parts—a bacterial study of surface and deep well waters, a field survey of the kind of water being supplied and the diseases present among stock, and a statistical study of the death rate among animals in the townships bordering upon the streams and those removed a few miles from streams. A summarized statement of this work is now in your hands as a bulletin.

TUBERCULOSIS.

The work upon tuberculosis has been largely field work, making diagnosis by the tuberculin tests and in assisting cities in making dairy inspections. The work has not been different from that done at other stations, but has been conducted with the view of obtaining data upon our local conditions. Since the Station made the first test in the State, nearly 2,000 cattle have been tested. A part of these have been tested by other veterinarians, who have furnished us their reports. At present the city of Indianapolis is testing all dairies when application is made for a health certificate. This will probably have the effect of adding 1,000 more tests to our records. The importance of the test as a means of diagnosing tuberculosis is just beginning to be felt in this State, and the present indications are that at least four more cities will inaugurate the tuberculin test as a part of their dairy inspection within the coming year.

No experiments have been conducted to study the means of infection or the danger arising from the use of the milk or flesh of affected animals. The experiments at other places have been much more thorough than could be conducted here with the present facilities. The recent claims made for the curative properties of oxy-tuberculin would warrant a trial treatment upon some cattle and should be undertaken as soon as possible.

THE FECUNDITY OF SWINE.

There is a very prevalent impression among farmers that it is unprofitable to breed pure-bred swine for breeding purposes, as they are supposed to be less prolific than the ordinary stock. The impression is general not only among farmers, but also among agricultural writers, and is sometimes hinted at by station workers. The statement is frequently made that the pure-bred hogs are less prolific than they were a few years ago, and that it is only a question of time until they will cease breeding in sufficient numbers to be profitable.

It is not the object of this inquiry to discuss influences which affect fecundity, but to make an inquiry into the number of pigs farrowed in the first 200 litters recorded in the various herd registers and in the last 200 litters, and make comparisons. At the same time this work was being done an inquiry was also made as to the number raised and the sex.

In compiling the data, 100 different litters were taken, from which sows were recorded, and 100 from which boars were recorded. The dates of farrowing for the first 200 litters vary through several years, while of those of the last 200 litters nearly all occurred in 1896. Owing to the imperfect method of recording the pedigrees of some registry associations, complete data could not be obtained upon all points desired or upon the full number. The following tables show the number of litters and size of litter, the total number farrowed in each litter and the gain or loss of the last litters over the first litters recorded. In like manner it shows the number raised:

BERKSHIRES.

(*National Herd Register.*)

Number of Pigs in Litter.	Number of Litters Farrowed.			Number of Pigs Raised.		
	First 200 Litters.	Last 200 Litters.	Total 400 Litters.	First 200 Litters.	Last 200 Litters.	Total 400 Litters.
1	0	0	0	0	0	0
2	1	0	1	3	2	5
3	1	3	4	7	6	13
4	7	4	11	12	15	27
5	10	13	23	19	25	44
6	12	23	35	20	26	46
7	34	41	75	44	49	93
8	48	35	83	38	30	68
9	35	30	65	34	28	62
10	25	23	48	15	9	24
11	14	12	26	5	3	8
12	8	11	19	2	5	7
13	2	4	6	2	1	3
14	0	1	1	0	1	1
15	2	0	2	0	0	0
16	1	0	1	0	0	0
Total	1,664	1,625	3,289	1,463	1,405	2,868
Average	8.32	8.13	8.22	7.37	7.03	7.15
Decrease in last litters over first litters	...	—.19	...	...	— 34	...

POLAND CHINA.

(*Ohio Record.*)

No. of Pigs in Litter.	No. of Litters Farrowed.			No. of Pigs Raised.
	1st 200 Litters.	Last 200 Litters.	Total 400 Litters.	Last 200 Litters
1	2	0	2	...
2	3	1	4	2
3	5	1	6	8
4	11	10	21	13
5	11	19	30	22
6	26	36	62	30
7	47	40	87	45
8	42	31	74	36
9	29	26	56	28
10	12	16	28	13
11	8	10	18	2
12	2	4	6	1
13	0	5	5	0
14	1	0	1	0
15	0	0	0	0
16	1	0	1	0
Total	1,463	1,510	2,978	1,247
Av. per Litter	7.34	7.65	7.45	6.24
Inc. last 200 Litters	...	+.31	...	...

POLAND CHINA.

(*Standard Record.*)

No. of Pigs in Litter.	No. of Litters Farrowed.			No. of Pigs Raised
	1st 200 Litters.	Last 200 Litters.	Total 400 Litters.	Last 200 Litters
1	0	0	0	2
2	1	1	2	8
3	3	6	9	13
4	11	8	19	22
5	21	14	35	30
6	34	37	71	45
7	45	36	81	36
8	36	44	80	28
9	30	27	57	13
10	10	16	26	2
11	4	9	13	1
12	2	1	3	0
13	1	1	2	0
14	1	0	1	0
15	0	0	0	0
16	1	0	1	0
Total	1,448	1,475	2,923	1,183
Av. per Litter	7.24	7.38	7.31	5.94
Inc. last 200 Litters	...	+.14	...	...

POLAND CHINA.

(*Central Record.*)

No. of Pigs in Litter.	No. of Litters Farrowed.			No. of Pigs Raised
	1st 86 Litters.	Last 200 Litters.	Total 286 Litters.	Last 200 Litters
1	0	0	0	2
2	0	1	1	4
3	1	4	5	13
4	3	6	9	16
5	10	30	40	37
6	6	21	27	35
7	17	34	51	39
8	9	49	58	32
9	20	27	47	12
10	6	17	23	9
11	6	7	13	0
12	1	3	4	1
13	4	0	4	0
14	2	0	2	0
15	0	1	1	0
16	1	0	1	0
Total	706	1,485	2,191	1,247
Av. per Litter	8.20	7.41	7.60	6.24
Dec. last 200 Litters	...	—.79	...	...

CHESTER WHITE.
(*Todd's Record.*)

No. of Pigs in Litter.	No. of Litters Farrowed.	No. of Pigs Raised.
	First and Last 100 Litters.	First and Last 100 Litters.
1	1	2
2	0	2
3	3	6
4	3	7
5	12	21
6	16	20
7	25	41
8	29	33
9	36	37
10	37	22
11	14	6
12	10	1
13	8	0
14	0	2
15	5	0
16	0	0
17	1	0
Total	1,749	1,487
Av. per litter	8.74	7.43

CHESTER WHITE.
(*Standard Record.*)

No. of Pigs in Litter.	No. of Litters Farrowed.			No. of Pigs Raised.		
	First 200 Litters.	Last 200 Litters.	Total 400 Litters.	First 200 Litters.	Last 200 Litters.	Total 400 Litters.
1	0	0	0	0	0	0
2	1	0	1	2	2	4
3	0	2	2	1	8	9
4	3	2	5	6	13	19
5	12	12	24	18	22	40
6	10	13	23	21	30	51
7	24	17	41	31	45	76
8	34	42	76	54	36	90
9	36	31	67	29	28	57
10	37	27	64	28	13	41
11	19	18	37	6	2	8
12	6	15	21	2	1	3
13	7	9	16	1	0	1
14	5	5	10	0	0	0
15	1	3	4	0	0	0
16	1	3	2	0	0	0
17	2	0	1	0	0	0
18	1	0	1	0	0	0
19	1	0	1	0	0	0
Total	1,812	1,814	3,626	1,550	1,518	3,068
Av. per litter	9.06	9.07	9.06	7.75	7.59	7.67
Increase or decrease in last 200 litters	....	+.01	....	....	−.16	....

SUMMARY.

No. of Pigs in Litter.	Total Number of Litters Farrowed.				Number of Pigs Raised.			
	Berkshire. 400 Litters.	Poland China. 1,086 Litters.	Chester White. 600 Litters.	Total. 2,083 Litters.	Berkshire. 400 Litters.	Poland China. 600 Litters.	Chester White. 600 Litters.	Total. 1,600 Litters.
1	0	2	1	3	0	4	6	10
2	1	7	1	9	5	15	11	31
3	4	20	5	29	13	37	25	75
4	11	49	8	68	27	61	47	135
5	23	105	36	164	44	100	76	220
6	35	160	39	234	46	127	96	269
7	75	219	67	361	93	111	131	335
8	83	212	105	400	68	82	90	240
9	65	160	103	328	62	39	78	179
10	48	77	101	226	24	20	30	74
11	26	44	51	121	8	3	9	20
12	19	13	31	63	7	1	2	10
13	6	11	24	51	3	0	0	3
14	1	4	10	15	1	0	2	3
15	2	1	9	12	0	0	0	0
16	1	3	4	8	0	0	0	0
17	0	0	3	3	0	0	0	0
18	0	0	1	1	0	0	0	0
19	0	0	1	1	0	0	0	0
Total	3,289	8,092	5,375	16,756	2,868	3,683	4,555	11,106
Average	8.22	7.45	8.96	8.04	7.17	6.14	7.62	6.94

A study of the tables show that, while there seems to be a reduction in the number of very large litters, the total number farrowed is about the same as shown by the first records.

It is not the intent to compare breeds, but to compare the earliest and latest records of litters to determine whether there has been a real gain or loss in the fecundity of the breed.

The number of boars and sows raised was as follows:

Berkshire, 400 litters, 2,866 pigs, 1,498 boars, 1,368 sows.

Poland China, 1,000 litters, 6,542 pigs, 3,228 boars, 3,314 sows.

Chester White, 600 litters, 4,555 pigs, 2,236 boars, 2,319 sows.

In a total of 3,693 pigs farrowed and all raised, there were 1,786 boars and 1,907 sows.

EXPERIMENTS IN DIPPING SHEEP FOR TICKS.

During the summer a number of experiments were made in the field and laboratory upon sheep dips for ticks. The tick unquestionably causes considerable loss to the sheep industry in the State, and the practice of dipping is becoming common. The dips recommended for the destruction of ticks are usually those that have been found to be effectual in destroying the scab parasite. While the scab dips are effectual, it is desirable to use the one least injurious to wool and sheep and most easily applied. The principal dips tried last summer were the new dips that resemble creolin, but which are much cheaper. They were Chloro-naptholeum, Zennoleum, Potter's Perfection Dip and Daytholeum. Experiments were made by dipping sheep in solutions of different strength and by taking live ticks and dipping them in the solution at the laboratory to determine the strength that would prove fatal. Samples of the different dips were received from the manufacturers and purchase made in the open market. The experiments were all conducted with material purchased in the market. The results of the experiments showed that all of these dips were effectual when used at a solution of one part to 100 of water; that they mixed readily with warm or cold water; that they maintained their strength throughout the dipping; that they were not injurious to the sheep or wool; were easily applied and economical. The details of this work are to be published elsewhere by the Station and in the Proceedings of the Indiana Wool Growers' Association.

THE MAMMARY GLAND.

The study of the mammary gland is not yet completed, but will probably be within the next few months.

DISEASES OF LIVE STOCK.

In nearly all works upon diseases of live stock, more or less importance is attached to the influence of season and location upon the occurrence of certain diseases. Some diseases, as pneumonia and pleurisy, are said to occur more often in the spring of the year, due to sudden changes of temperature, cold rains, etc., than at other seasons. Other diseases, like cerebro-spinal meningitis (staggers), are said to occur in the fall, due to the condition of the pasture or development of certain fungi at that period. How far these statements are true we are unable to decide, as the statistical records published are too few to warrant drawing conclusions. It has seemed desirable to have more observations upon these points, and for two years we have endeavored to collect the necessary data from the practicing veterinarians. Blanks were sent out to all the veterinarians, asking for a monthly report upon the diseases occurring in their practice. The results for the year 1896 were unsatisfactory, and no reports were received after the eighth month. In 1897 a different plan was pursued—return postal cards, with printed blanks, were sent out each month. The results are not altogether satisfactory, but they do give a basis for comparison upon 15 reports.

There are about 100 qualified veterinarians in the State, and about 40 sent in reports a part of the time, and 15 for each month. Those giving full reports are located at Alexandria, Anderson, Columbus, Connersville, Evansville, Fort Wayne, Greensburg, Indianapolis, Lafayette, Muncie, Portland, Terre Haute, Tipton, Vincennes and Winchester. Two tables are presented, one showing the total number of cases reported each month and one giving the total number of cases reported from the fifteen cities each month. These tables are comparable:

TABLE I.

SUMMARY OF ALL CASES REPORTED EACH MONTH BY FIFTEEN VETERINARIANS IN INDIANA.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Lameness	336	231	163	165	170	217	144	257	160	108	191	146	2288
Fistulae	86	21	16	24	26	49	35	37	28	36	23	15	399
Bursatte	......	......	......	......	......	7	11	5	1	1	......	......	25
Cerebro spinal meningitis	7	2	5	5	3	4	1	4	5	2	3	3	44
Parturient apoplexy	45	32	30	37	37	63	23	20	30	29	21	14	381
Periodic ophthalmia	30	22	19	23	23	32	23	26	25	14	21	13	281
Pleurisy	29	16	16	16	23	9	5	18	24	34	......	......	190
Pneumonia	81	32	24	26	17	19	16	29	27	36	22	28	355
Laminitis	41	18	22	22	28	40	39	43	34	26	21	9	343
Enteritis	20	10	12	6	14	8	11	27	16	14	10	9	157
Gastritis	15	8	13	9	17	21	19	13	21	30	23	22	219
Colic	97	140	154	175	145	187	126	163	170	156	141	125	1779
Azoturia	83	89	67	89	51	19	13	13	13	22	19	28	506
Canine distemper	50	73	43	33	12	27	15	20	24	26	26	23	372
Specific ophthalmia (of cattle)	16	10	2	......	......	......	1	7	......	......	......	......	36
Sporadic aphthae	1	11	1	......	2	1	......	......	4	......	1	1	22
Tetanus	34	10	8	11	14	1	4	......	12	19	20	6	149
Tuberculosis	8	5	4	3	3	......	......	......	......	......	25	......	48
Influenza	423	220	196	141	96	142	103	140	150	147	188	162	2110
Rabies	2	......	......	......	......	......	......	2	4	2	......	......	10
Glanders	5	......	......	......	......	1	2	......	......	......	......	......	8
Actinomycosis	19	8	5	7	9	5	6	2	10	9	8	1	89

TABLE II.

SUMMARY OF ALL CASES OF DISEASE REPORTED EACH MONTH IN INDIANA.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Lameness	426	319	250	189	296	217	177	257	187	168	309	240	2975
Fistulae	124	53	47	28	53	49	56	37	33	36	39	32	587
Bursatte	2	......	......	......	......	7	11	5	1	1	1	......	28
Cornstalk disease	10	8	2	4	2	1	1	......	......	......	1	......	29
Cerebro spinal meningitis	4	4	7	5	3	......	6	4	7	2	5	9	59
Parturient apoplexy	72	42	43	40	68	63	52	20	32	29	37	30	528
Periodic ophthalmia	61	31	28	28	32	32	30	26	32	14	35	19	268
Pleurisy	39	23	35	16	34	9	12	18	30	34	......	......	250
Pneumonia	120	51	40	31	57	19	37	29	30	36	44	49	543
Laminitis	69	38	39	24	46	40	60	43	39	26	41	24	489
Enteritis	29	17	17	7	22	8	17	27	20	14	18	21	217
Gastritis	30	13	14	12	25	21	22	13	23	38	30	25	266
Colic	464	120	222	183	223	187	173	163	186	156	129	236	2042
Azoturia	188	135	116	90	68	19	19	13	14	22	30	45	759
Canine distemper	79	100	53	37	37	27	18	20	24	26	43	38	502
Specific ophthalmia (of cattle)	28	16	15	......	......	......	1	7	......	......	......	......	67
Sporodic aphthae	4	11	1	......	2	1	......	......	4	......	3	4	30
Tetanus	51	20	19	14	25	......	4	......	12	19	31	23	218
Tuberculosis	14	6	5	2	5	......	......	......	......	......	33	2	67
Influenza	537	264	288	148	174	142	134	140	168	147	253	209	2608
Rabies	4	......	......	......	......	......	......	2	4	2	......	......	12
Glanders	5	1	2	......	4	1	2	......	......	......	......	5	24
Abortion—cows	12	7	6	2	......	......	......	......	......	......	11	4	42
Abortion—mares	3	2	6	......	......	......	......	......	......	......	......	4	15
Anthrax	3	......	......	......	......	4	1	......	......	......	......	......	8
Actinomycosis	30	14	7	7	15	5	7	2	10	9	8	6	120

A close study of this table will show that in 1897 there was little difference in the number of cases occurring in the different months of the year. With the exception of azoturia, which shows an increase for the months of February, March, April and May, bursatte, which is reported for July, August and September, and a slight increase in the number of cases of laminitis for July, August, September and October, practically no differences are observed. Pneumonia, tetanus and parturient apoplexy do not occur more often at one time than at another. It also shows that parturient apoplexy and tetanus are much more common diseases than generally supposed.

A table of the distribution of the diseases in the State has not been prepared for publication, as observations were not taken at a sufficient number of points. The reports are interesting, in that they are indicative of the frequent occurrence of some diseases in some places and rare in others. Fistulae is a disease supposed to be due to injuries, but is found to occur much more frequently in some places than others. The difference is too great to be ascribed to accidental causes. If reports could be obtained upon such diseases for several years it might serve to throw some new light upon their pathology. These reports also serve as an index of what diseases to study.

Hog cholera is the most important disease in the State, because of the immense losses it causes. The losses for 1897 are only about 70 per cent. as much as in 1896. The townships bordering upon the rivers lose 50 per cent. more than those in the second tier, and 70 per cent. more than those in the third tier—indicating that it is a water-borne disease.

Glanders occurred in several places in the State, principally in the northwestern part. In all about 90 animals were affected; most of them came from Chicago.

Specific ophthalmia of cattle caused less trouble than usual in the Kankakee pastures.

Texas fever (splenic apoplexy) occurred at three places in the State, due to shipping cattle from the South, against the government regulations. The losses were small.

Sheep scab is spreading, and it is believed that much of it is caused by purchase of sheep shipped into the State for feeding purposes and contracting the disease in infected pens and cars.

The large Bur-Headed Worm (Echinothorynchus gigas) of the hog has caused considerable loss to the intestines of hogs as sausage casings. Several packers have stated that their losses on this product alone would aggregate several thousand dollars.

Respectfully submitted,

A. W. BITTING,

Veterinarian.

REPORT OF THE AGRICULTURAL DEPARTMENT.

To C. S. Plumb, Director:

Sir—The lines of work pursued by the department during the year were in the main a continuation of the work previously begun. The following new lines of work were taken up:

1. A comparison of forage crops.
2. A comparison of various leguminous plants.
3. Relation of size of plat to yield of wheat.
4. Relation of heavy and light seed wheat to yield.
5. Early and late sowing of winter oats.
6. Deep and shallow planting of corn.
7. Test of fertilizers applied in combination and quantities to represent current farm practice.

So far as results or conclusions of value were reached, these newly begun experiments will be referred to later in the body of the report.

The early part of the growing season of 1897 was quite unfavorable to spring crops. This was especially true of corn, and a poor stand resulted. These unfavorable conditions interfered much with the experiment with this cereal for the year.

The cold weather following the sowing of oats on ground that had not been plowed resulted in a strong growth of weeds, which did much to hold the oats in check and reduce the yield of this crop.

Although unfavorable to spring crops, the early part of the season was unusually favorable to winter wheat, as was shown by the rapid recuperation of this crop after the winter months were passed.

I. EXPERIMENTS WITH VARIETIES.

1. Wheat.—Number of varieties grown in 1897, 13; time under trial, 1 to 14 years; average yields, ranging from 11 to 30 bushels; yields in 1897 ranged from 9 to 30 bushels; more promising varieties, Russian, Michigan amber, Velvet chaff, bearded Winter fife.

2. Oats.—Number of varieties grown in 1897, 21; time under trial, 1 to 9 years; average yields ranged from 30 to 55 bushels; yields in 1897 ranged from 22 to 35 bushels; more promising varieties, White Russian, Black Oats, White Swede and Black Prolific.

3. Grasses and Clovers.—This is a continuation of last year's experiment with grasses and clovers, referred to in the annual report for 1896. The red horse sorrel (Rumex acetosella) has largely taken possession of many of the plats so that the yields were very much reduced. It was impossible to determine, at all closely, the effect of the horse sorrel upon the yields of these plats, hence the figures in the table below can only be considered as roughly approximate. The plats are of the same size and the varieties marked with a star were cut twice:

YIELDS OF RASSES AND CLOVERS.

VARIETY.	Plat Yields in Pounds.	Description.
Lathyrus sylvestris	780	Good stand; very slow growth; not liked by live stock, either green or cured.
*Alfalfa	317	Badly mixed with common clover, owing to its slow growth the year previous.
*Alsike clover	372	Considerably mixed with common red clover.
*Common red clover	420	Fine growth.
*Mammoth clover	416	Fine growth; slightly mixed with common red clover.
Festuca elatior (Taller fescue).	120	Imperfect stand; slight growth.
Lolium perenne (English rye grass).	105	Poor stand; poor growth.
Bromus inermis (Awnless brome grass).	60	Very poor stand.
Bromus pratensis (Meadow brome grass).	35	Very poor stand.
*Orchard grass	120	Headed May 1; ten days earlier than any other variety; stands drouth well; good pasture grass.
*Timothy	165	
Red top	220	A good but slow growth; headed June 25.
Avena elatior (Tall oat grass).	145	A very poor stand; an early grass and strong grower.
Grass mixture No. 1 (Orchard grass, tall oat grass, meadow fescue and common red clover).	315	Only red clover and orchard grass showed to any extent in the crop.
*Grass mixture No. 2 (Timothy, red top, taller fescue and mammoth clover).	410	The crop was composed chiefly of clover.

Common red clover had invaded to a greater or less extent the plats of alfalfa and alsike clover, orchard grass, timothy and red top, and doubtless increased the yields of these plats somewhat. The seed of the newer varieties seemed to lack greatly in vitality. Orchard grass, timothy, red top and the several varieties of clover named, germinate well and give good crops here. The other varieties cannot be recommended on the results obtained at this Station. Lathyrus sylvestris is entirely too slow to be grown in rotation. This is also true of alfalfa, although it is not so slow as the other.

4. Forage Crops.—Barteldes & Co., of Lawrence, Kan., sent the Sta-

YIELDS OF OATS ON SERIES H.

No.	FERTILIZERS USED.	Pounds Fertilizer Per Acre.	Yields Per Acre.	
			Bushels Grain.	Pounds Straw.
1	None		53.90	940
2	Acidulated phosphate Nitrate of soda Muriate of potash	250 75 60	51.56	1,849
3	Acidulated phosphate Nitrate of soda Muriate of potash	125 75 60	56.25	1,560
4	Acidulated phosphate Nitrate of soda Muriate of potash	125 75 30	56.56	1,635
5	Acidulated phosphate Nitrate of soda Muriate of potash	125 75 30	61.69	1,826
6	None		50.78	1,567
7	Acidulated phosphate Nitrate of soda Muriate of potash	125 75 15	68.91	1,797
8	Acidulated phosphate Nitrate of soda Muriate of potash	125 37.5 60	58.75	1,886
9	Acidulated phosphate Nitrate of soda Muriate of potash	125 18.7 60	59.37	1,416
10	None		52.50	1,363

IV. DEEP AND SHALLOW CULTURE OF CORN.

Time under trial, 9 years; range in depth of culture, 1 to 4 inches; average yield per acre as follows:

From cultivation, 1 inch deep	44 bushels.
From cultivation, 1 inch deep	43 bushels.
From cultivation, 3 inch deep	41 bushels.
From cultivation, 4 inch deep (last 4 years only)	31 bushels.

Yields in 1897—

Culture, 1 inch deep	43 bushels.
Culture, 2 inch deep	42 bushels.
Culture, 3 inch deep	43 bushels.
Culture, 4 inch deep	38 bushels.

The low average yields in the table are due to drouths in 1893, 1894, 1895 and 1897.

V. EXPERIMENTS WITH CORN CULTIVATORS.

The following named implements have been under trial in this experiment:

1. The Albion Spring-Tooth Wheel Cultivator, with six teeth in each gang.
2. The Tower's Surface Cultivator, whose reversible, flat blades shave the soil, but stir it only to a very slight depth.
3. The Hoosier Cultivator, which has flat blades, whose action is much the same as that of Tower's cultivator.
4. The Corn Plow, consisting of two shovels in each gang. Bull tongues have been used instead of the inside shovel for the first and second cultivations, as a rule.

Name of Cultivator.	*Time Under Trial.*	*Yield Per Acre.*
Albion spring tooth	9 years.	55 bushels.
Corn plow	9 years.	53 bushels.
Hoober cultivator	8 years.	53 bushels.
Tower's Cultivator	5 years.	52 bushels.
Breed's weeder and harrow	4 years.	50 bushels.

The above showing is unfair to the implements which have been under trial only four or five years, owing to the drouths of 1893, 1894, 1895 and 1897.

The Albion spring-tooth cultivator has produced a little better average yield than any other implement. This implement does very effective work and is easily managed. It is considered the best one of the cultural implements under trial.

VI. EFFECT OF PREVIOUS MANURING ON YIELD OF CORN.

The ground devoted to this experiment has grown corn continuously since 1880. In 1883 and 1884 fresh horse manure was applied to alternate plats, amounting for the two years to about 50 tons per acre. No manure has been used in this series of plats before or since the two years named. The manured plats show an average increased yield per acre of more than nine bushels. The aggregate increase from manure in 15 crops has been 128.4 bushels to the acre. The increase in 1897 was 2.4 bushels to the acre, showing that the manure has not yet been exhausted.

VII. EFFECT OF HEAVY AND LIGHT APPLICATIONS OF MANURE AND FERTILIZER.

This experiment was begun in 1889, and has been carried on continuously since. The plan of the experiment includes a variety of crops to be grown in shorter or longer rotations, and also the continuous growing of wheat and corn on the several series of plats. Certain plats in each of the several series received heavy and light applications of fertilizers or manure.

Frequently recurring and severe drouths have thus far greatly interfered with this series of experiments. In some cases the drouth has been so intense as to prevent the manure or fertilizer from having any beneficial effect upon the yield.

At the outset the purpose of this experiment was to determine the effects of applying manure or fertilizer to the soil in quantities sufficient to meet the demands of a maximum crop. This was soon found to be unprofitable, as frequently recurring drouths prevented the crops from getting full benefit from the fertilizer. During the last two or three years of the experiment the aim has been only to apply such quantities of fertilizers and manures as might prove profitable. The results to date are somewhat conflicting. In general it may be stated that the heavier applications of fertilizer have proved quite unprofitable. The lighter applications of fertilizers have sometimes returned a profit. Heavy manuring has proved quite unprofitable in some cases, and as a rule less profitable than light applications of manure. The lighter applications of manure have as a rule proved quite profitable. The soil in which these experiments are being conducted is still fairly fertile. In an average season it would doubtless produce 20 bushels of wheat and 40 bushels of corn without fertilizer. The experiment will need to be conducted several years before very definite conclusions can be reached.

VIII. CONTINUOUS GROWING OF CLOVER.

This experiment, like the preceding, was begun in 1889. The series of plats devoted to it have been kept constantly in clover since that time, the ground being broken and reseeded to clover whenever the stand began to fail. The purpose of the experiment is to determine the effect of continuous clover growing and removal of the crop on the nitrogen of the soil. Certain plats of the series received manure or fertilizer and certain plats received no fertilizer of any kind. The crop has been regularly removed each year from all the plats. The results thus far indicate what many other experiments have shown—that the continuous growing of any one crop tends to reduce the yield. It will take some years yet to determine the effect of the clover upon the nitrogen content of the soil.

The Assistant Agriculturist, Mr. W. B. Anderson, has had charge of nearly all the details of the field work, and he has also tabulated the results of the experiments. His work has been carefully performed, and I believe the results are therefore practically correct.

Respectfully submitted,

W. C. LATTA,
Agriculturist.

APPENDIX.

ACKNOWLEDGMENTS.

The following gifts have been made to the Station during the year, and to the givers of these, thanks are herewith rendered:

United States Department of Agriculture, Washington, D. C. Numerous publications, seeds, etc. Also 500 pounds sugar beet seeds.

W. Atlee Burpee & Co., Philadelphia, Pa. Garden and flower seeds.

The Deming Co., Salem, Ohio. One each of Bordeaux spray, "Deming-Vermorel" spray combination nozzle, and hose coupling and hose stock.

J. S. Lintner, New York State Entomologist, Albany. Eleventh Report of the New York State Entomologist for 1895.

C. W. Bush, Granville, Ill. One peck of Early Jewel oats.

J. W. Austin, Pilot's Point, Texas. Twelve of Austin's Improved Dewberry plants.

J. McLain Smith, Secretary, Dayton, Ohio. Vols. VIII and IX, Red Polled Herd Book.

E. Tully, Penza, Ohio. Tubers Early Trumbull potatoes.

M. Crawford, Cuyahoga Falls, Ohio. One dozen Clark blackberry plants.

H. C. Marsh, Muncie, Ind. One-half peck seed potatoes.

Peter Henderson & Co., New York City. Seeds.

Clifton George, Lathrop, Mo. Engraving of pig.

Prof. C. P. Fox, Moscow, Idaho. Package Idaho coffee bean. (Cicer areitimum.)

E. Rauh & Sons, Indianapolis, Ind. Sack bone meal.

W. H. Bowker, Boston, Mass. Bottle nitrogen.

Wm. R. Sessions, Secretary, Boston, Mass. Report Massachusetts State Board of Agriculture for 1896.

J. H. Maiden, Government Botanist, Sydney, New South Wales. Reports on New South Wales plants worth cultivating and in the Government Botanic Gardens.

R. C. Lake, Indianapolis, Ind. Half gallon can lice exterminator.

F. Barteldes & Co., Lawrence, Kansas. Packets of seeds.

DeLaval Separator Co., Chicago, Ill. Repairs on separator.

Frederick L. Houghton, Secretary, Brattleboro, Vt., Vol. XIV Holstein-Friesian Herd Book.

Northwestern Seed Co., Faribault, Minn. Seeds.

H. M. Dunlap, Secretary, Transactions Illinois State Horticultural Society for 1896.

Nicholas Chemical Co., New York City. Barrel Laurel Green insecticide.

Deering Co., Chicago, Ill. Repairs to mower.

Clizbe Bros., Chicago, Ill. Sickle grinding machine.

Genessee Salt Co., Chicago, Ill. Barrel dairy salt.

German Kali Works, New York City. Pamphlets on potash manuring.

John Lewis Childs, New York; Henry A. Dreer, Philadelphia, Pa.; J. M. Thornburn, New York; R. & J. Farquhar, Boston, Mass.; Peter Henderson & Co., New York; American Bulb Co., seeds of calceolarias and cinerarias.

E. K. Morris, Secretary, Indianapolis, Ind. Vols. IV, V, VI, National Berkshire Record.

W. H. Morris, Secretary, Indianapolis, Ind. Vols. I, II, III, IV, Standard Chester White Record, and Vols. XV, XVI and XVII, Central Poland China Record.

Carl Friegau, Secretary, Dayton, Ohio. Vol. VI, American Chester White Record, and Vols. I to IV of Todd's Improved Chester White Swine Record.

C. R. Thomas, Secretary, Independence, Mo. Vol. XVI, American Hereford Record.

Chris Hansen's Laboratory, Little Falls, N. Y.; O. F. Douglas Co., Boston, Mass., and Conn. Butter Culture Co., Waterloo, Iowa. Butter Cultures.

W. W. Chapman, Secretary, London, England. Vol. VI, Southdown Flock Book for 1897.

PERIODICALS.

The publishers of the following periodicals have kindly sent them to the Station during the year. These are leading journals and are used for frequent consultation both by the Station Staff and the agricultural students of the University:

UNITED STATES.

American Agriculturist	New York.
Agricultural Epitomist	Indianapolis, Ind.
American Creamery	Chicago, Ill.
Agricultural Student	Columbus, Ohio.
American Cultivator and Poultry Keeper	Los Angeles, Cal.
American Florist	Chicago, Ill.
American Gardening	New York, N. Y.
American Grange Bulletin	Cincinnati, Ohio.
American Horticulturist	Wichita, Kan.

American Sheep Breeder and Wool Grower	Chicago, Ill.
Baltimore Sun (weekly)	Baltimore, Md.
Breeders' Gazette	Chicago, Ill.
Colman's Rural World	St. Louis, Mo.
Creamery Journal	Waterloo, Iowa.
Dakota Field and Farm	Sioux Falls, S. D.
Drainage Journal	Indianapolis, Ind.
Elgin Dairy Report	Elgin, Ill.
Experiment Station Record	Washington, D. C.
Farm and Dairy	Ames, Iowa.
Farm and Fireside	Springfield, Ohio.
Farm and Home	Chicago, Ill.
Farm, Field and Fireside	Chicago, Ill.
Farm Journal	Philadelphia, Pa.
Farm Poultry	Boston, Mass.
Farmers' Call	Quincy, Ill.
Farmers' Guide and Home Companion	Huntington, Ind.
Farmers' Home	Dayton, Ohio.
Farmers' Magazine	Springfield, Ill.
Farmers' Review	Chicago, Ill.
Farmers' Voice	Chicago, Ill.
Field and Farm	Denver, Col.
Grange Visitor	Lansing, Mich.
Gentleman Farmer	Chicago, Ill.
Hoard's Dairyman	Fort Atkinson, Wis.
Holstein-Friesian Register	Brattleboro, Vt.
Home and Farm	Louisville, Ky.
Hospodar	Omaha, Neb.
Indiana Farmer	Indianapolis, Ind.
Industrial American	Lexington, Ky.
Industrialist	Manhattan, Kan.
Iowa Homestead	Des Moines, Iowa.
Jersey Bulletin	Indianapolis, Ind.
Journal of Agriculture	St. Louis, Mo.
Kansas Farmer	Topeka, Kan.
Live Stock Journal	Indianapolis, Ind.
Live Stock Report	Chicago, Ill.
Louisiana Planter	New Orleans, La.
Market Garden	Minneapolis, Minn.
Michigan Farmer	Detroit, Mich.
Mirror and Farmer	Manchester, N. H.
Montana Fruit Grower	Missoula, Mont.
National Stockman and Farmer	Pittsburg, Pa.
Nebraska Farmer	Lincoln, Neb.
New England Farmer	Boston, Mass.
New England Florist	Boston, Mass.

North American Horticulturist	Monroe, Mich.
Orange Judd Farmer	Chicago, Ill.
Oregon Agriculturist	Portland, Ore.
Pacific Coast Dairyman	Tacoma, Wash.
Pacific Rural Press	San Francisco, Cal.
Practical Dairyman	Chatham, N. Y.
Practical Farmer	Philadelphia, Pa.
Prime's Crop Bulletin	Dwight, Ill.
Progressive South	Richmond, Va.
Public Ledger (daily)	Philadelphia, Pa.
Reliable Poultry Journal	Quincy, Ill.
Rural Northwest	Portland, Ore.
Silent Hoosier	Indianapolis, Ind.
Southern Cultivator and Dixie Farmer	Atlanta, Ga.
Southern States	Baltimore, Md.
Success With Flowers	West Grove, Pa.
Sugar Beet	Philadelphia, Pa.
Wallace's Stockman and Farmer	Des Moines Iowa.
Weather and Crops	Chicago, Ill.
Western Soil Culture	Minneapolis, Minn.
Wisconsin Agriculturist	Racine, Wis.
Wool Review	New York, N. Y.

The following periodicals have been received during the year from Indiana publishers:

Advertiser, The	Medarysville.
Banner, The	Bluffton.
Enterprise, The	Richmond.
Herald, The	Cayuga.
Herald, The	Jasper.
Herald, The	Lyons.
Home Journal, The	Lafayette.
Hoosier State, The	Newport.
Journal, The	Osgood.
Journal, The	Rossville.
Lafayette Commercial Gazette, The	Lafayette.
Leader, The	Newburgh.
Magnet, The	Angola.
Mail, The	Columbia City.
Mail, The	Milford.
Mennonitische Rundschau	Elkhart.
News, The	Petersburg.
Recorder, The	Rising Sun.
Register, The	Crown Point.
Times, The	Parker City.
Wayne Farmer, The	Hagerstown.

FOREIGN.

Agricultural Gazette of New South Wales	Sydney, Australia.
Farmers' Advocate	London, Ontario, Can.
Farming	Toronto, Ontario, Can.
La Produccion Argentina	Buenos Ayres, Arg. Rep.

In addition to the above the following periodicals are subscribed for by the Station and are on file for reference:

Analyst, The	London, England.
Annalen der Chemie	Leipzig, Germany.
Berichte der Deutschen Botanischen Gesellschaften	Berlin, Germany.
Botanisches Centralblatt	Cassel and Marburg.
Botanische Zeitung	Leipzig.
Bulletin le la Societe Chemique de Paris	Paris, France.
Centralblatt für Bakteriologie und Parasitenkunde	Jena, Germany.
Entomologist	London, England.
Gardeners' Chronicle	London, England.
Journal für Landwirthschaftlicher	Berlin, Germany.
Journal of the Royal Agricultural Society of England	London, England.
Journal of the Chemical Society	London, England.
Landwirthschaftliche Jahrbücher	Berlin, Germany.
Live Stock Journal	London, England.
Veterinary Journal	London, England.
Veterinarian	London, England.
Zeitschrift für Analytische Chemie	Wiesbaden, Germany.
Zeitschrift für Pflanzenkrankheiten	Stuttgart.

TREASURER'S REPORT EXPERIMENT STATION.

As Treasurer of Purdue University, I hereby submit my report of all moneys received during the year ending June 30, 1897, on account of Experiment Station funds:

From U. S. Government	$15,000 00
From farm receipts	1,134 86
Total	$16,134 86

JAMES M. FLOWER,
Treasurer Purdue University.

FINANCIAL STATEMENT.

The Agricultural Experiment Station of Indiana, in account with the United States, for the year ending June 30, 1897:

DEBIT.

Received of the Treasurer of the United States, receipts as shown by the Treasurer's report		$15,000 00

CREDIT.

Salaries	$8,817 13	
Labor	2,834 53	
Publications	787 56	
Postage and stationery	106 63	
Freight and express	97 73	
Heat, light and water	382 16	
Chemical supplies	305 76	
Seeds, plants and sundry supplies	539 24	
Fertilizers	25 78	
Feeding stuffs	219 32	
Library	165 84	
Tools, implements and machinery	225 66	
Furniture and fixtures	68 17	
Scientific apparatus	7 75	
Live stock	175 50	
Traveling expenses	102 27	
Contingent expenses	16 48	
Building and repairs	122 49	
Total		$15,000 00

I hereby certify that the above is a correct statement of expenditures in Station Fund for year ending June 30, 1897.

E. A. ELLSWORTH,
Secretary Board of Trustees.

IMPROVEMENT FUND EXPERIMENT FARM FOR YEAR ENDING JUNE 30, 1897.

DEBIT.

Balance, June 30, 1896		$930 63
Receipts from farm for 1897		1,134 86

CREDIT.

Salaries	$460 70	
Labor	553 45	
Publications	181 10	
Postage and stationery	7 40	
Freight and express	22 83	
Heat, light and water	50 00	
Seeds, plants and sundry supplies	97 47	
Feeding stuffs	4 00	
Library	3 66	
Tools, implements and machinery	19 30	
Furniture and fixtures	6 70	
Scientific apparatus	5 85	
Live stock	304 50	
Traveling expenses	8 55	
Contingent expenses	237 10	
Building and repairs	22 90	
Balance	79 98	
	$2,065 49	$2,065 49

I hereby certify that the above is a correct statement of expenditures from Improvement Fund for year ending June 30, 1897.

E. A. ELLSWORTH,
Secretary Board of Trustees.

BULLETIN No. 64. VOL. VIII. APRIL, 1897.

FIELD EXPERIMENTS WITH CORN, OATS AND FORAGE PLANTS.

BY W. C. LATTA AND W. B. ANDERSON.

The growing season of 1896 was in this section a striking illustration of the value of water in crop production. The rains were copious and well distributed. As a result, corn and oats made healthy, vigorous growth and bountiful yields. The rains were, unfortunately, superabundant shortly after the oat harvest, and greatly damaged both wheat and oats wherever standing in the shock. All who got their oats in bin or mow before the rains, as was the case on the Station farm, realized handsomely on their promptness, while those who were behind in their work lost heavily both in the quantity and quality of their crops.

The lesson should be heeded. It is always safer and generally far more profitable to secure the crop at the earliest opportunity after the harvest.

Owing to severe, prolonged drouth in 1895, the experiments undertaken with corn and oats that year were all abandoned. The experiments with these crops in 1896 were, in the main, a continuation of work previously begun.

I. EXPERIMENTS WITH CORN.

The test of varieties of corn has been abandoned for the reason that, on the high and dry soil of the Station farm, the larger and later kinds are so frequently damaged by the oft-recurring drouths as to make the results unsatisfactory and misleading. The experiments with corn described below were, therefore, conducted with a single variety, a rather small, early, yellow dent, which has been regularly grown on the Station farm for more than a dozen years.

Early and Late Planting.—This experiment was begun in 1888 and has been carried on continuously since, with the exception of 1891 and 1895, when interfered with by drouth. The accompanying table shows the number of years the corn has been planted at each of the several dates, gives the yield in 1896 and also the average yield:

YIELDS FROM EARLY AND LATE PLANTING.

DATE OF PLANTING.	No. of Years.	Bushels Per Acre.	
		1896.	Average.
May 1st	6	*52.84	42.95
May 8th to 11th	7	53.74	42.30
May 15th to 16th	5	54.26	34.71
May 21st to 22nd	7	61.46	40.72
May 28th to 30th	5	56.70	36.68

*Average of three plats.

It will be observed that the average yield is a little greater for the earliest planting than for any later date. The naturally drained soil of the Station farm becomes dry and warm early in the spring, and this will doubtless account for the favorable result from early planting.

Thickness of Stand in Relation to Yield.—This experiment was begun in 1885 and has been carried on continuously since, with the exception of 1895, when it was abandoned on account of drouth. A two-horse drill-planter has been regularly used which places the rows three and two-thirds feet apart and drops the kernels singly, as shown in the table below:

YIELDS PER ACRE FROM THICK AND THIN PLANTING.

STALKS. Inches Apart.	1896.		Average of 11 Years.	
	Bushels Corn.	Lbs. Stalks.	Bushels Corn.	Lbs. Stalks.
Eleven	46.54	5,649	†39.43	‡3,897
Twelve	49.71	5,067	42.79	§4,387
Fourteen	48.34	4,794	44.00	§3,941
Sixteen	*47.90	*4,334	40.83	§3,513
Nineteen and one-half	47.96	3,951	§38.28	‡3,231

*Average of three plats. †Average of ten years.
§Average of eight years. ‡Average of seven years.

The table shows (1) that the highest average yield of grain was obtained with stalks 14 inches apart; (2) that the highest average yield of stover was obtained with stalks 12 inches apart; (3) that the proportion of grain was increased by thinner planting and decreased by thicker planting.

In order to note the effect of season on the yields and proportions of grain and stover, attention is called to the following table, which gives the results of two favorable seasons—1888 and 1891—in comparison with two dry seasons—1893 and 1894:

EFFECT OF SEASON ON YIELD AND PER CENT. OF GRAIN.

STALKS. Inches Apart.	Seasonable, '88–'91.		Per Cent. of Ears.	Dry, '93–'94.		Per Cent. of Ears.
	Bushels Corn.	Lbs. Stalk.		Bushels Corn.	Lbs. Stalk.	
Eleven	59.14	4,960	45.5	13.80	4,360	18.1
Twelve	57.81	4,201	49.6	14.28	5,204	16.1
Fourteen	57.79	4,158	49.3	19.39	3,762	26.5
Sixteen	54.05	4,065	48.2	21.27	3,143	32.2
Nineteen and one-half	49.76	3,617	49.1	22.07	3,092	33.3

The above table shows (1) that the yields of both grain and stover increase in proportion to thickness of stand in the seasonable years—1888 and 1891; (2) that in the dry years—1893 and 1894—the yields of stover increase with thicker planting, while the yields of grain decrease; (3) that the per cent. of grain decreases gradually from thicker planting in the favorable years and very rapidly in the dry years; (4) that a greater total yield of corn and stover is obtained from thicker planting even in dry years. The table clearly emphasizes the importance of thinning corn in dry seasons as a means of increasing the yield and per cent. of ears.

Deep and Shallow Culture of Corn.—This experiment has been carried on in its present form six years, with the exception of the plat cultivated four inches deep, which was added in the spring of 1894. The plowing has been regularly performed in the spring, the ground being broken uniformly eight inches deep. The spring-tooth cultivator has been regularly employed in the cultivation of the plats. The corn has been planted in drills each year, which prevented cross-cultivation. The results as to yield are shown in the following table:

BUSHELS PER ACRE FROM DEEP AND SHALLOW CULTURE.

DEPTH OF CULTIVATION.	1896.	Average of Six Years.
About one inch deep	51.20	38.68
About two inches deep	*51.42	39.19
About three inches deep	53.44	37.83
About four inches deep	47.87	†28.81

*Average of two plats. †Average of last three years.

It appears that the highest yield in 1896 was obtained from cultivation three inches deep, while the highest average yield was produced by culture two inches deep. The average yields, however, will prove a safer guide in farm practice than the results of a single year.

Relation of Crop Rotation to Yield of Corn.—The purpose of this experiment is to ascertain the effect on yields, from continuous grain-growing in comparison with a rotation of crops. Corn, oats and wheat have been grown continuously or in alternation with each other on one series of plats for fifteen years. These same crops in rotation with grass (timothy and clover) have been grown the same time on an adjacent series of plats. No manure or fertilizer has been used on either series since the experiment began. The crops have all been removed every year from both series and the two series have been treated alike in all rspects, except as to system of cropping.

In the spring of 1896 both series of plats were plowed and put into corn. The results, as to yield of corn for the last nine years, are given in the accompanying table:

BUSHELS PER ACRE FROM ROTATION AND ALL-GRAIN CROPPING.

Plan of Cropping.	Average of Nine Years.	1896.
Crops grown in rotation	33.46	54 08
Grain crops only grown	27.24	48.42
Gain from rotation	6.22	5.66

The above table makes an excellent showing in favor of a judicious rotation of crops.

For nine years the plats devoted to rotation have averaged over six bushels more corn to the acre than the all-grain series of plats. At the end of this test these plats in rotation which have, previous to 1896, produced in the aggregate about 50 bushels more corn to the acre than the all-grain plats, are still in the lead five and two-thirds bushels to the acre.

Effect of Previous Manuring on Yield of Corn.—In this experiment corn has been grown continuously since the spring of 1880. In 1883 and in 1884 fresh horse-manure was applied to certain plats, amounting in the two years to about 50 tons per acre. No manure has been used since. The effect of the manure on the yield of corn is shown in the accompanying table:

YIELD AND INCREASE IN BUSHELS PER ACRE FROM PREVIOUS MANURING.

Year.	Manured.	Un-manured.	Increase.	Year.	Manured.	Un-manured.	Increase.
1883	56 9	47.5	9.4	1891.	37.5	27.2	10.3
1884	53.5	39.1	14.4	1892.	33.1	26.5	6.6
1885	63.7	42.2	21.5	1893.	16.7	13 3	3.4
1886	45.6	26.4	19.2	1894.	25.0	20.3	4.7
1887	7.0	5.5	1.5	1895.	12.8	9.2	3.6
1888	60.1	52.1	8.3	1896.	37.2	31.0	6.2
1889	51.2	38.1	13.1	Average of 14 years.	38.23	29.22	9.1
1890	38.6	31.6	7.0				

It appears from the table that for fourteen years, twelve of which followed the application of manure, the manured plats have averaged nine bushels more corn to the acre than the unmanured plats. The aggregate increase from the manure in the fourteen years is 126 bushels per acre, and the gain from manure in 1896 is still over six bushels to the acre. During all this period there have been corresponding gains of stover on the manured plats.

In view of the fact that the manured and unmanured plats have been in juxtaposition, permitting diffusion of fertility to the unmanured plats, the above results give striking proof of the value and enduring effect of stable manure.

Continuous Corn Culture With and Without Fertilization.—This experiment was begun in the spring of 1889, but no fertilizer was used that year, as the purpose was to test the natural fertility of the several plats of the series. Although corn is grown every year, rye is sown each fall and turned under the following spring as a green manuring for the succeeding corn crop.

The corn and stalks have been regularly harvested and removed each year. A mixture of dissolved bone black, sulphate of ammonia and muriate of potash has been used each year since 1889, on plats 2 and three of the series. Fresh horse manure has been used the same length of time on plats 5 and 6. The average amounts of fertilizer and manure applied are given in the table below, which shows the yield and increase per acre, on an average and for 1896. In calculating the increase in yield the gains on the interplats (not shown in the table), due to the diffusion of plant food or to cross-feeding, are added to the gains on the fertilized and manured plats:

YIELDS AND INCREASE FROM FERTILIZATION, IN CONTINUOUS CORN CULTURE.

No.	KIND OF FERTILIZER.	Av. No. Pounds Fertilizer.	Bushels, 1886.		Av. of Seven Years.	
			Yield	Increase.	Yield, Bushels.	Increase, Bushels.
1.	Nothing		49.84		38.66	
2.	Bone black Sulphate of ammonia Muriate of potash	273.1 408.0 117.3	54.41	7.08	41.41	7.23
3.	Bone black Sulphate of ammonia Muriate of potash	175.4 205.9 70.9	56.36	8.08	41.91	6.89
4.	Nothing		49.03		36.10	
5.	Horse manure	14,786	56.80	8.45	42.86	8.12
6.	Horse manure	9,857	54.37		42.58	7.26
7.	Nothing		47.91	5.90	36.40	

At the current commercial values of the crop, and of the manure and fertilizer, the increase from fertilization has not justified the extra expense involved.

This is doubtless due, in part, to the fact that the system of cropping is not well calculated to effect a full utilization of manure and fertilizer applied. The results would, doubtless, have been better if a variety of crops had been grown.

Field Tests of Cultural Implements.—For several years various corn-cultivating implements have been under trial on the Station farm. At first the corn was planted in drills permitting cultivation but one way. In 1893 the plan was changed to permit the testing of the implements in both hill and drill corn. The cultivator in all the hill-planting has been in two directions with each implement. In the accompanying table the hill and drill plats have been thrown together, and their average yields only are shown:

YIELDS WITH DIFFERENT CULTURAL IMPLEMENTS.

CULTIVATOR USED.	Years Under Trial.	Average Yield, Bushels.	Yield in 1896, Bushels.
Albion spring-tooth	8	57.28	82.48
Corn plow	8	55.56	85.50
Hoosier cultivator	7	56.14	88.40
Tower's cultivator	4	55.71	87.86
Planet Jr. cultivator	5	52.91	82.78
Breed's weeder and harrow	3	53.12	82.14

The Albion spring-tooth cultivator is, everything considered, the most satisfactory, but the differences in average yield were slight.

Hill and Drill-Planting of Corn.—During the last three years this experiment has been conducted with the preceding one. During this time the experiment has included nine series of five plats each, making forty-five plats each year. The first year of the test three plats in each series were planted in drills and two in hills. The next two years the order was reversed, two plats in each series being planted in drills and three in hills. The hills were placed three and one-half feet apart each way, and thinned to three stalks in each hill. The drill-planting placed an equal number of stalks on the same area. The ideal or perfect stand is not maintained through the season, as occasional stalks are destroyed by the cultural implements or from other causes. The actual yield of the plats and the calculated yields for perfect stand are therefore both given in the accompanying table, which shows the averages for the three years. The two columns on the right of the table show the per cent. of increase from perfect stand over the actual yield.

AVERAGE YIELDS FROM HILL AND DRILL PLANTING.

No. of Series.	Bushels Per Acre.				Increase From Perfect Stand.	
	Actual Yield.		Corrected Yield.		Hilled, Per Cent.	Drilled, Per Cent.
	Hilled.	Drilled.	Hilled.	Drilled.		
I	51.25	47.66	56 66	52.08	10.55	9 27
II	45.27	46.92	48 71	50.94	7.59	8 56
III	46.55	45.23	50.56	49.51	8.61	9.46
IV	43.77	44.85	46.66	47.89	6.60	6.78
V	46.19	44.00	49.90	49 19	8.03	11.79
VI	47.66	45.00	51.37	53.67	7.78	19 26
VII	50.50	48.08	54.38	52.20	7.68	8.56
VIII	39.26	39.58	41.09	41.89	4.66	5.81
IX	43.79	41.17	47 60	46.16	8.70	12.12
Average yield	46.03	44.72	49.40	49.37	7.80	10.40

It appears that the hill-planting averaged a little greater yield. It appears also that the drill-planting shows a greater per cent. of increase in yield on reducing to perfect stand. This shows that, under the conditions of the experiment in which several cultural implements were used, more stalks were destroyed in drill than in hill-planting. Whether the same result follows in general farm practice is of course an open question. The differences in actual yield per acre are so slight that other considerations, namely, convenience, cost of implements and culture, should decide which method of planting is to be preferred.

Comparison of Corn and Kaffir Corn.—White and red varieties of Kaffir corn were planted last spring in two plats alternating with three plats of yellow dent corn, for the purpose of ascertaining the relative yields of grain and stalk. The planting was in drills, the rows being three and one-half feet apart. The seed was thickly planted, but after the plants were well started each plat was divided into three equal parts and thinned, as shown in the following table, which gives the yields of common corn and the average yields of the two varieties of Kaffir corn per plat:

YIELDS OF COMMON AND KAFFIR CORN FROM THICK AND THIN PLANTING

Part of Plat.	Kind of Corn.	Stalks, Inches Apart.	Pounds Shelled Grain.	Pounds Stalks.
East third	Common corn	6	155 3	165.9
	Kaffir corn	6	34.2	373.7
Middle third	Common corn	8	174.6	172.1
	Kaffir corn	6	80.6	307.7
West third	Common corn	8	159.3	186.2
	Kaffir corn	8	26.2	307.7

The yields of the entire plats per acre are shown below:

YIELDS PER ACRE OF COMMON AND KAFFIR CORN.

KIND OF CORN.	*Bushels Grain.	Pounds Stalks.	Total Lbs. Grain and Stalks.
Yellow dent corn	79.60	5,973	11,781
White kaffir corn	25.51	11,205	12,634
Red kaffir corn	18.87	10,706	11,763

*Fifty-six pounds are allowed for one bushel.

The Kaffir corn made a vigorous growth and many of the stalks were fully one and one-half inches in diameter at the base, but it did not fully mature, owing to an early frost, and this accounts in part for the low yield of grain. It produced a very leafy growth, and there was considerable sweetness in the stalks at the time of cutting. The stalks when field-cured are very firm. No careful feeding test was made, but it is not at all probable that Kaffir corn can take the place of common corn to any extent in this State.

TABLE GIVING AVERAGE RESULTS OF CO-OPERATIVE TEST OF VARIETIES OF CORN.

VARIETY.	ELKHART COUNTY.				GRANT COUNTY.				BARTHOLOMEW COUNTY.				POSEY COUNTY.				Average Number Bushels Per Acre.
	No. Years Grown.	Bushels Per Acre.	Height, Inches. Base of Ear.	Height, Inches. Tip of Stalk.	No. Years Grown.	Bushels Per Acre.	Height, Inches. Base of Ear.	Height, Inches. Tip of Stalk.	No. Years Grown.	Bushels Per Acre.	Height, Inches. Base of Ear.	Height, Inches. Tip of Stalk.	No. Years Grown.	Bushels Per Acre.	Height, Inches. Base of Ear.	Height, Inches. Tip of Stalk.	
1. Home Grown	3	62.94	35	85	*2	37.08	41	85	....	....	....	....	....	....	....	....	50 01
2. Orange Judd	*2	68.01	45	99	*2	34.90	38	86	....	....	....	....	....	....	....	....	51.45
3. Dekalb County Yellow	3	66.92	38	91	*2	31.64	44	86	....	....	....	....	....	....	....	....	52.81
4. 100-Day Yellow	*2	66.87	40	90	*2	39.58	46	92	....	....	....	....	....	....	....	....	53.18
5. Hartman's White	3	67.83	42	96	*2	45.71	54	110	....	....	....	....	....	....	....	....	58.98
6. Early Yellow	3	64.05	38	86	*2	37.29	44	88	....	....	....	....	....	....	....	....	53.35
7. Riley's Favorite	3	61 07	42	95	*2	39.90	42	86	†1	50.02	43	103	†1	50.34	39	93	51.91
8. Wayne County White	....	....	....	....	....	....	....	....	3	67 86	59	121	3	73.97	53	116	70.92
9. Smith's Improved	....	....	....	....	....	....	....	....	*2	63.01	50	119	*2	64.12	50	105	63.56
10. Success White	....	....	....	....	....	....	....	....	3	61.23	62	120	3	78.80	52	117	70.02
11. Fleming's Yellow	....	....	....	....	....	....	....	....	*2	67.63	46	121	*2	78.51	44	97	73.07
12. Boone County White	....	....	....	....	....	....	....	....	3	67.58	52	116	3	71.83	45	107	69.87
13. White Prolific	....	....	....	....	....	....	....	....	3	70 83	56	125	3	81.12	48	113	75.99
14. Home Grown	....	....	....	....	....	....	....	....	‡3	65.09	51	115	‖3	84.75	59	131	74.92

*Grown in these counties in 1894 and 1895.

†Grown in these counties in 1896 only.

‡Average of two plats of same variety grown each year.

‖Average of two different varieties grown each year.

NOTE.—The varieties of corn under trial were obtained from the following counties in this State: No. 2, Kosciusko County; No. 3, Dekalb County; No. 4, Miami County; Nos. 5, 6, 7 and 12, Boone County; No. 8, Wayne County; Nos. 9 and 11, Delaware County; No. 10, Washington County; No. 13, Johnson County.

Comparative Test of Varieties of Corn.—This experiment has been continued three consecutive years. Its purpose is to ascertain the adaptation of a few leading varieties of corn to different sections of the State.

The experiment in Elkhart County was conducted by Mr. A. C. Mehl, Goshen; in Grant County, by Mr. I. M. Miller, Upland; in Bartholomew County, by Mr. J. C. Glick, Columbus; in Posey County, by Mr. J. H. Gwaltney, Poseyville.

Owing to the poor health of Mr. Miller, the experiment was continued but two years in Grant County.

The accompanying table gives the averages obtained for the three years of the test.

The "home-grown" varieties of corn given in the table are those that had been grown some years by the respective experimenters. The earlier varieties were grown in the northern counties and the later kinds in the southern counties.

The table sets forth some interesting data as to length of stalk and height of ear. So far as yield is concerned, the varieties under trial compare favorably in most cases with the "home-grown" varieties. Several reports of the experimenters show, however, that the introduced varieties did not prove as satisfactory as the home-grown. This view tallies with the results obtained, in previous years, in testing varieties of corn on the Station farm. The evidence is clear that each locality may have, or may develop, a variety of corn better suited to the local conditions than those which may be introduced from other places. To do this requires not only generous treatment as to the soil and culture, but continued care in the selection of the particular type of corn desired.

II. EXPERIMENTS WITH OATS.

The field experiments with oats in 1896 included:

1. A comparison of varieties.
2. A test of winter oats.
3. The growing of oats in a three-year rotation with and without fertilization.

Comparison of Varieties.—Twenty-seven varieties were under trial the past season. The yields per acre and also the average yields of those varieties which have been previously grown on the Station farm, with the time under trial, are shown in the following table:

YIELDS OF VARIETIES OF OATS.

No.	VARIETY.	Bushels in 1896.	Number of Years Grown.	Average Number Bushels.
1	Red oats	75.16	1	
2	Early Golden Prolific	64.12	1	
3	White Maine	62.12	1	
4	White German	56.85	1	
5	Mammoth Cluster	47 59	1	
6	Mortgage Lifter	51.50	1	
7	White Russian	74.70	1	
8	Calgary Grey	81.30	1	
9	*Duplicate of No. 1*	83 75	1	
10	Siberian	67 80	1	
11	Gothland	74.22	1	
12	White Scotch	76.02	1	
13	Black Tartar	59.96	1	
14	White Poland	61.31	1	
15	Early Jewel	80.74	1	
16	*Duplicate of No. 1*	84.15	1	
17	Silver Mine	69.60	1	
18	White Bonanza	71.53	7	48.03
19	White Superior Scotch	53.94	2	55.70
20	Black Prolific	80.50	3	61.42
21	Improved White Russian	73.28	6	54.97
22	Great Northern	63.00	3	52 62
23	*Duplicate of No. 1*	81 68	1	
24	Badger Queen	58.85	5	46.01
25	Lincoln	61.48	2	59.09
26	Black Russian	79.91	1	
27	Giant Yellow French	56.96	5	49.05
28	American Banner	82.13	4	62.42
29	White Swede	74.45	1	
30	*Duplicate of No. 1*	69 00	1	

Owing to the unusually wet season in 1896, nearly all the varieties of oats lodged badly. This made it impossible to harvest the plats perfectly. Some allowance was made for the portion not harvested, but it is believed that the yields would have been larger than given in the table if all the grain had been secured. The weight per measured bushel was below the legal standard of 32 pounds in most cases. The varieties weighing more than 32 pounds to the bushel were Nos. 1, 6, 18, 19, 20, 22, 25 and 27. No. 6 produced the heaviest grain, weighing 38⅝ pounds to the measured bushel.

A Test of Winter Oats.—In the fall of 1895 seed of winter oats was obtained from the Huntington Seed Company, of Indianapolis, and from N. D. Gaddy, of Lovett, Ind. The seed was sown in plats side by side in the field devoted to winter wheat. Though sown at the same time as the wheat, the oats plats were seriously winter-killed, while the wheat escaped injury. Weeds grew rampant in both plats in the spring and summer of 1896. There was an abundance of chess and cockle in both plats, the seeds of which must have been in the oat seed, as these pests were not found elsewhere in the field.

The yields of the winter oats plats are:

Plat No. 1	28.13 bushels per acre.
Plat No. 2	37.51 bushels per acre.

The yields of spring oats given in the preceding table were obtained on essentially the same soil as that on which the winter oats grew.

A plat of winter oats sown in the fall of 1894 was completely killed out in the following winter.

Three plats of winter oats were sown again in the fall of 1896. At this writing they appear to be completely killed.

If sown very early, say in August or early September, winter oats would doubtless yield good fall pasture and might then pass the winter more successfully.

Winter oats must, for the present, be regarded as a very uncertain crop for the north half of the State.

Growing Oats in Rotation With and Without Fertilization.—This experiment was begun in the spring of 1889. A three-year rotation was decided upon for certain plats consisting of corn, barley and wheat. After one crop of barley had been grown, oats were substituted therefor. Rye is sown in the corn, and clover in the wheat, but each is plowed under the following spring for green manure.

Two crops of oats have been harvested, in 1893 and 1896. Certain plats in the series devoted to this experiment receive fertilizers or manure each year, the amount varying with the crop. The following table shows the average amounts of fertilizer and manure applied to the oats crops per acre. The table also gives the yields of oats and the increase per acre from fertilization:

YIELDS OF OATS WITH AND WITHOUT FERTILIZATION.

No.	Fertilizer Used.	Average Number Lbs. Fertilizer.	Bushels—1896.		Average of Two Years.	
			Yield.	Increase.	Yield.	Increase.
1	Nothing		49.53		42.73	
2	Bone black Sulphate of ammonia Muriate of potash	83.5 99.5 58.5	66.09	14.56	56.49	12.68
3	Bone black Sulphate of ammonia Muriate of potash	116.3 58.8 61.0	64.84	14.04	53.22	9.60
4	Nothing		54.66		45.77	
5	Horse manure	9,000	68.69	18.91	57.16	14.15
6	Horse manure	6,000	65.72	14.72	53.83	9.79
7	Horse manure		50.97		43.61	

The same kinds of fertilizer and manure were used in this experiment as in the corn experiment previously referred to. The increase in yield was also obtained in the same way as in the corn experiment.

Although the yield was considerably increased by fertilization, it was not sufficient to justify the increased cost involved.

III. NOTES ON GRASSES AND CLOVERS.

A small portion of the Station farm is regularly devoted to experiments with grasses and clovers, etc. The following is a list of the principal varieties sown in the spring of 1896, with brief notes on the same:

GRASSES.

Phleum pratense. (Timothy.) This grass is too well known to require much comment. It is one of the surest grasses to start well from seed and is entirely hardy.

Agrostis vulgaris. (Red Top.) This grass starts well from seed, makes a fair growth the first season and is perfectly hardy. It is best suited to low, wet lands, but grows well on uplands that possess sufficient moisture.

Dactylis glomerata. (Orchard grass.) This grass seeds well, starts promptly after sowing, makes a good growth the first year, maintains itself well in the soil for a series of years, is perfectly hardy and one of the best combined hay and pasture grasses.

Festuca elatior. (Taller fescue.) This grass is a valuable one, but the seed has proved quite uncertain here. When once started, this grass holds well on dry soils, and is therefore a good pasture grass.

Festuca pratensis. (Meadow fescue.) This is much like the preceding grass in its adaptation to dry soils. It has not started well from seed here. It has a less vigorous habit than the taller fescue and is a softer grass. It would probably prove an excellent pasture grass if a full stand could be secured.

Bromus inermis. (Awnless brome grass.) This grass made a very poor stand, due, probably, to low vitality of the seed. It is a very leafy grass and is said to endure drouth exceedingly well. It is considered an excellent hay and pasture grass.

Bromus pratensis. (Meadow brome grass.) This made even a poorer stand than the preceding. It is impossible to speak of its merits, from its record here.

Avena elatior. (Tall oat grass.) This grass starts only fairly well from the seed. It makes a quick, tall, but rather open, growth here, and can hardly be commended on its record at this Station.

CLOVERS.

Trifolium hybridum. (Alsike.) This is perhaps the hardiest of the clovers. It starts well from the seed and makes a fair yield of excellent hay. It is recommended for the colder soils and more exposed situations.

Trifolium pratense. (Common red clover.) This clover, like all the others, usually starts well from the seed when sown by itself in the spring in properly prepared soil.

Trifolium medium. (English or mammoth clover.) This is not readily distinguished from the common red clover either in the seed or early stages of growth. It matures later and is, therefore, better for sowing with timothy or hay.

Lathyrus sylvestris. (Flat pea.) This is not a true clover, but a leguminous plant. It has a deep, strong tap root, resembling alfalfa. The stems are flattened and too weak to stand erect on the soil of the Station farm. The plant does not seed freely here. It is entirely too slow to be of any value in a rotation of crops. On light, sandy soils it would doubtless work a great benefit if left undisturbed for three or four years. It is known to yield considerable crops of hay on light soils. It is not relished by stock either in the green or cured form. It is doubtless nutritious and stock would probably learn to like it.

Medicago sativa. (Alfalfa.) This plant, which is closely related to the clovers, starts well from the seed, but its growth is feeble the first year. It should, therefore, be sown only in clean ground.

Alfalfa also requires three or four years to reach its full vigor. It is not, therefore, adapted to a short rotation. It does best on land having an open subsoil which will permit the roots to enter freely.

When once well established it endures drouth well and makes good yields of excellent hay. It makes good pasture for cattle, but is easily damaged by the close cropping of horses and sheep.

The following are the yields of the several plats of grasses and clovers sown in the spring of 1896. In the early summer the plats were all clipped with the mowing machine to hold the weeds in check, but nothing was then removed from the plats. Early in September the plats, which are of nearly equal size, were mown and the weights of cured hay are as follows:

WEIGHTS OF HAY ON GRASS PLATS.

	Pounds.
Taller fescue	30
Meadow fescue	25
Awnless brome grass	47
Meadow brome grass	32
Orchard grass	57
Timothy	55
Red top	45
Tall oat grass	50
‡Mixture of four early grasses	90
*Mixture of four late grasses	90
Alsike clover	65
Common red clover	125
English clover	115
Alfalfa	65
Lathryus (flat pea), sown in 1894	297

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‡ Orchard and tall oat grass, meadow fescue, and common red clover.

* Timothy, taller fescue, red top and English clover.

SUMMARY.

1. The best results have been obtained by planting corn before May 10th.

2. The greatest average yield of grain has been obtained when the stalks of corn stood about fourteen inches apart in the row.

3. The greatest average yield of stalks, and the greatest total yield of grain and stalks have been obtained when the stalks stood about 12 inches apart.

4. Thick planting has invariably reduced the size of the ears and the per cent. of grain.

5. Thick planting has produced the heaviest yields of both grain and stalks in seasonable years.

6. Thick planting has usually produced the heaviest yield of stalks in dry years, while the yield of grain has invariably been reduced in dry seasons.

7. The best average yields have been obtained from culture about two inches deep.

8. Cultivation four inches deep has considerably reduced the yield of corn.

9. A judicious rotation of crops has been found helpful—(1) in maintaining the yields, and (2) in conserving soil fertility.

10. Experiments have shown that a dozen years of constant cropping will not fully exhaust a liberal application of horse manure.

11. In continuous corn culture manure and fertilizers have not proved profitable.

12. Cultural implements, very different in construction and in action upon the soil, have produced only slight differences in the yield of corn.

13. The Albion spring-tooth cultivator has produced the highest average yield of corn. It is, everything considered, the best cultural implement that has been tried.

14. Hill-planting has produced slightly greater average yields than drill-planting. The difference appears to be due to the fact that more stalks are destroyed in the cultivation of drilled corn.

15. In one year's trial, Kaffir corn produced a greater total weight of crop than common corn, athough the latter produced decidedly more grain than the former.

16. In the co-operative test of varieties of corn, the introduced varieties compared favorably with the home-grown as to yield. The general verdict, however, is in favor of the home-grown varieties of corn.

17. Red oats, which have been grown several years in the vicinity of the Experiment Station, produced on one plat a higher yield than any recently introduced variety.

18. The average yield of five plats of this home-grown variety (78.75 bushels) was exceeded by only five other varieties in a list of twenty-seven.

19. The experiments with manure and fertilizers on oats have not given profitable returns for the fertilization.

20. Experiments have shown winter oats to be a very uncertain and unprofitable crop at this Station.

21. Of several grasses under trial, orchard grass, timothy, awnless brome grass and red top are considered the most reliable and desirable.

22. Of the several leguminous crops, alsike, common red and English clover are considered the best for growing in rotation.

23. Alfalfa and Lathyrus sylvestris will produce much forage and exert a wholesome effect on the soil if left to grow three or more years; but they are not at all adapted to a short rotation of crops.

BULLETIN NO. 65. VOL. VIII. JUNE, 1897.

FORMALIN FOR PREVENTION OF POTATO SCAB.

BY J. C. ARTHUR.

The parasitic nature of potato scab and a practical method of preventing the disease were first demonstrated by the Indiana Experiment Station. A historical account of the work at this Station up to the close of the year 1895 was given in a bulletin (No. 56) published last year.*

The Corrosive Sublimate Treatment.—It was there stated that trials at this Station, and also at many others, as well as the experience of cultivators, have demonstrated that an efficient preventive for scab is found in the corrosive sublimate treatment of the seed tubers. No fewer than sixteen stations, besides Indiana, namely, Delaware, Illinois, Iowa, Kentucky, Maryland, Michigan, Minnesota, Montana, New Jersey, New York, North Dakota, Rhode Island, South Dakota, Vermont, West Virginia and Wyoming have conducted trials confirming the claim that it is a practical and valuable fungicide for scab, while most of the remaining stations have indorsed it by recommending its use. Moreover, the simplicity in its application, and the uniformity of results have caused it to be widely adopted by cultivators.

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*An unfortunate typographical error occurs in that bulletin on page 73. The dates at the left of the upper and lower diagrams should be exchanged; the upper diagram illustrates the crop of 1892, and the lower that of 1894. However, the diagrams were so crudely and imperfectly constructed by the compositor, that most of their intended value has been lost.

From the first there was an objection to its use on account of its intensely poisonous nature, necessitating much caution in handling, and always suggesting the possibility of an accident. This association of danger with the remedy has hindered its general acceptance and is likely always to confine it to the more cautious and enthusiastic growers of the potato.

Other Fungicides for Scab.—Various other substances, including Bordeaux mixture, eau celeste, ammoniacal carbonate of copper, copper sulphate, ferrous sulphate, zinc chloride, zinc sulphate, potassium permanganate, potassium sulphide, sodium hyposulphite, sodium chloride, calcium chloride, calcium sulphate, oxalic acid, sulphur, and others, have been tested as preventives of scab. The last five mentioned were usually applied to the soil, the others usually to the seed tuber. All these substances have been found in some degree beneficial in checking the scab, but none, unless it may be sulphur,* has proved equal to corrosive sublimate. Many other substances have been tried which have mostly acted as an aid to the development of the scab, rather than a hindrance. In short, all effort up to the present time has failed to discover a preventive of scab equal to corrosive sublimate in efficiency and ease of application, yet free from its poisonous and corrosive properties.

A New Fungicide.—The present bulletin makes what is believed to be the first announcement, or even suggestion, of a preventive having the good qualities of corrosive sublimate without its bad ones, and which may confidently be looked upon as the future standard fungicide for this disease. The substance is formalin.

Formalin (sometimes incorrectly called formal) is the trade name of a 40 per cent. solution of formaldehyde (CH_2O) in water, a substance whose germicidal action was discovered by Loew in 1888, and which has recently come into prominence for various economic purposes,† promising to attain much popularity. Formaldehyde is a colorless, pungent gas, obtainable from wood alcohol, and readily soluble in water. Like ammonia, it is generally used in a watery solution, the 40 per cent. solution bearing the distinctive name of formalin, being the standard. Formalin has a smell scarcely as unpleasant as kerosene, and reminding one of it somewhat. It volatilizes slowly. Used in any sensible way, it is perfectly harmless. The fumes when strong prove irritating to the throat and eyes, and if long continued might be hurtful.* It is not poisonous, even when taken internally.† Like every other substance having active properties, formalin

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*Especially favorable results by applying flowers of sulphur to the soil have been obtained by B. D. Halsted in New Jersey (Bulletin No. 112). In experiments performed by the writer in 1890, in which sulphur was placed in the hills at time of planting, no marked advantage was secured, and further trials of it were abandoned as unpromising. This was also the experience in a trial made by H. L. Bolley in 1891 (Proc. Soc. Prom. Agric. Sci., 1896, p. 81).

In a careful review of Halsted's work by H. J. Wheeler and G. M. Tucker (Rhode Island Bulletin No. 40) in the light of numerous experiments with other substances applied to the soil, and additional experiments with sulphur, the conclusion is reached that the use of flowers of sulphur is of doubtful value, and as a corrective of contaminated soil practically worthless.

Further experiments by Halsted (New Jersey Bulletin No. 120) during the season of 1896 have confirmed his earlier conclusions. He says that "sulphur has maintained the first place as a remedy for scab, and its wholesome effect upon the soil is demonstrated as remaining undiminished through at least the second season."

†In Merck's Market Report for 1896 it is listed with following statement: "Non-irritating, non-toxic, non-corrosive, surgical and general antiseptic in wounds, abscesses, etc., for clothing, bed-linen, walls, etc.; food preservative for wine, beer, jellies, preserves, etc., preservative of collyria, and anatomical or botanical prepara-

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tions." It is similarly mentioned in the U. S. Dispensatory, 17th edition (p. 1685), and in Sadtler and Trimble's Chemistry for Medical Students. (Phila., 1895, p. 590). It is especially serviceable in preserving milk samples desired for analysis. E. J. Bevan (l. c., p. 152) states that he finds four drops of the commercial article to four ounces of milk sufficient to keep samples perfectly (for chemical analysis) for six weeks, or longer. It is being used to some extent by milk venders in Europe and various parts of the United States, including Indiana, to give their milk keeping qualities, but with doubtful propriety. It has been found (Weigle and Merkel, l. c.) that it coagulates the casein and renders it insoluble in hydrochloric and acetic acids. On this ground alone, for its general action on the human system has not yet been studied, its use in milk and probably other food materials is inadvisable, and especially so in food for infants. As a disinfecting agent it promises to be of great value, although possibly not well adapted to general surgery. Ermengen and Sugg (l. c., p. 934) have found that clothing exposed to the gas in closed vessels had anthrax and other pathogenic germs, including their spores, killed in three to twelve hours at ordinary room temperature, and without injury to the fabrics. When spores were absent the germs were killed in one-fourth hour. With higher temperature the time was much shortened. Walter (l. c., p. 119) found that in solutions containing one part of formalin to ten thousand, all growth of anthrax, cholera, typhus and diphtheria germs was impossible. Many other tests might be cited (see bibliography) showing the many ways in which formalin promises to be a germicide of great usefulness, when its properties and applications are fully ascertained and made known. It has come rapidly into favor in the last two years for the preservation and hardening of animal and vegetable tissues in the laboratory and museum. For keeping certain fruits and vegetables in jars for exhibition purposes nothing more simple and satisfactory has yet been discovered. Many other uses might be enumerated, but the above outline is sufficient to give some idea of the general character and value of the substance under consideration.

*A guinea pig kept under a jar for several hours with fumes from 42°/₀ formalin died some days after being taken out (Pottevin, l. c.).

†Dr. Samuel Rideal says: "As to its toxic action, I have not heard of any ill effects, and have myself repeatedly drunk the 1°/₀ solution" (l. c., 158).

Since this bulletin was begun, Dr. A. W. Bitting, of the veterinary department of this station, has made some experiments with formalin on horses, and he has kindly permitted me to record some of his results in this connection.

A horse of about 750 lbs. weight was offered nearly a pint (300 cc.) of dilute formalin containing 4 per cent. of formaldehyde. He drank part of it voluntarily, while the remainder was given in the usual manner of a drench, but without resistance on the part of the animal. No inconvenience or bad effects were shown at the time or subsequently.

Another horse was subjected to 9 cc. of full strength (40°/₀) formalin injected into the jugular vein. The reaction was immediate and violent. The head was first strongly shaken, with stamping of the feet and other spasmodic motions. The is likely to prove injurious, however, if taken in excessive amounts, either as a gas or in connection with liquid or solid food; and as much may be said of ammonia, kerosene, turpentine and many other substances in daily use, and accounted harmless.

An interesting matter in connection with formalin is the supposed association of formaldehyde with the production of starch in green leaves. The present generally accepted theory among botanists regarding the conversion of carbon dioxid and water into carbohydrates, which takes place in green parts of plants under the action of sunlight, is known as the aldehyde theory, and was first proposed by Bäyer in 1870. It assumes that water unites with carbon dioxid in the chlorophyll grains to form formaldehyde, which is at once transformed into more complex substances, and finally into starch; and from this starch the plant is nourished. The surplus not needed at once by the plant for growth is stored in tubers and grains, and is made of service to mankind for food.

So much for the general nature and status of formalin. Being a comparatively new substance to the public, and probably not known to all pharmacists, through whom the public must obtain the supply for domestic use, it seemed best to devote some space to a general account of it. We will return to its application as a fungicide for potato scab. In the following pages all strengths are given in terms of formalin, as being more convenient than estimating the amount of formaldehyde.

Preliminary Experiments in Greenhouse.—Preliminary trials of formalin were made in the greenhouse during the winter of 1895-6. On November 8th, 1895, four lots of five tubers each, all smooth and free from scab, were used to test the action of formalin upon germination of the

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muscles of the neck became rigid, and the head was drawn down as in tetanus. These effects lasted about 20 minutes, and in 35 minutes had entirely disappeared. The horse now ate and acted in a normal manner. After 2½ hours the same operation was repeated, this time with 12 cc. of full strength formalin. The same effects were exhibited, but they were much less violent. Six hours later the animal was killed, and showed only slight and unimportant irritation of the blood passages, such as the injection of a weak brine or other harmless substance would produce. The effects were not of a toxic nature.

In still another test, a strong, healthy horse of 950 lbs. weight was injected as before with 20 cc. of undiluted formalin. So large an amount of irritating fluid could not fail to produce marked effects, when thrown suddenly into the circulation. The symptoms which followed were somewhat different from those of the previous more moderate and gradual treatment. Marked uneasiness showed in three minutes, rising to distinct symptoms of colic with spasmodic action of the alimentary tract. At the end of fourteen minutes the pulse was 76 per minute and weak, but no strong cerebral or tetanic symptoms had developed. At the end of an hour cyanosis was strongly marked, showing that the blood had been profoundly affected. The horse was killed at the end of two and a half hours, and the blood found to be very dark and slow in coagulating.

These cases clearly demonstrate that it takes a large amount of formalin to produce marked or lasting effects, and that even under exceptionally violent treatment, formalin has little or none of the action of a poison, but may have serious effects as an irritant, or possibly a disorganizer when in sufficiently large quantity.

tubers. One lot was left untreated for control. The other three lots were soaked for two hours in water containing formalin; for one lot the solution was of the strength of 1:800, the second 1:400 and the third 1:200. All the tubers were planted in a box of soil in the greenhouse. On January 18, 1896, they were examined, and the tubers showed no deleterious action of the formalin. They had germinated somewhat irregularly, and three tubers were still dormant, due to the evident fact that they had been planted before completing the necessary period of rest, but there was not the slightest change to be detected that could be ascribed to the formalin.

On January 18, 1896, another test was made in the greenhouse, conducted in the same manner as the preceding, except that in each lot of five, three of the tubers were smooth and two scabby. On February 1st all the tubers, smooth and scabby alike, had germinated freely, and showed no injury or other effect of the formalin treatment, whatever the strength of the solution.

On March 30, 1896, a third trial was made with stronger solutions. Three strengths were used, namely, 1:200, 1:120 and 1:40. Three smooth tubers were immersed in each solution for two hours, then planted in a box of soil in the greenhouse. The record of germination was taken on April 15, 1896, when all the tubers were found to have grown, without any variation of importance, and none that could be traced to the formalin. It was now reasonably certain that no strength of formalin, likely to be required as a fungicide, would prove harmful to the germinating action of the potato.

In the meantime a preliminary test had been conducted to ascertain if the formalin treatment had fungicidal action upon the scab. One of the scabby potatoes from each of the four lots planted on January 18, referred to above, was transplanted February 1 to a six-inch flower pot. All four plants made vigorous growth until March 30, when they were turned out and the young tubers removed and examined. The control pot with the untreated seed tuber contained five new tubers, all abundantly scabbed; one especially being almost covered with deep scab spots. The pot with seed tuber treated to formalin of the strength of 1:800, yielded seven tubers, only one of which showed scab, and that in only a single spot. The pot, in which the treatment was of strength 1:400, gave three tubers, all slightly scabby, there being five or six spots altogether. The pot receiving the strongest treatment, strength of 1:200, gave five tubers without a trace of scab. The results are tabulated in Table I; and an illustration is

I. GREENHOUSE TEST WITH FORMALIN.

	Untreated.	Formalin 1-800.	Formalin 1-400.	Formalin 1-200.
Yield of tubers	5	7	3	5
Number showing scab	5	1	3	0

shown on the title page of this bulletin, engraved from a photograph of the yield from untreated seed and from that treated with a solution of the strength of 1:200.

These preliminary trials were on a small scale; but after making all reasonable allowances, they seemed to strongly favor the view that in formalin was to be found a successful fungicide for scab.

Field Experiments.—The trials in the field were carried out for the larger part with seed tubers of the State of Maine that had been selected in the fall of 1895, and carried through the winter in fine condition by burying in a straw and dirt-covered pile out of doors. Every tuber was thoroughly encrusted with scab (plate 1, fig. 1), and too deeply pitted to have marketable value. The tubers being large, were cut, after treatment, into pieces approximating one and one-half ounces in weight and planted with one piece in a hill. The hills were one and one-half feet apart, with three feet between the rows, and were given level culture. The piece of ground had been used continuously for potatoes for the seven preceding years, and the soil was far from being free from scab germs. A certain percentage of scab in the crop was to be anticipated, therefore, as contagion from the soil even with the most thorough destruction of all germs on the seed tubers by preventive treatment.

The soil of the experimental plats is not in general well adapted to potato culture, or even to the production of scab, being too shallow and light, and too heavily drained by many feet of gravel subsoil. No fertilizers were used and the ground was not especially rich.

The season was unusually favorable to a crop upon this ground, as the usual protratcted drouth in July did not occur. As will be seen by the table (II), the departures from the normal (the average of seventeen years) were shown in higher temperature for April and May, and heavy rainfall in July, both favoring the potato crop, and the scab as well. A number of times during July the plats were flooded, and the rains and cloudy skies together often kept the ground saturated for days at a time. Under such circumstances, potatoes in an infected soil would be sure to become scabbed, even when the seed tubers had been rendered entirely sterile of scab germs. The most efficient treatment of seed tubers could, therefore, only reduce the amount of scab in the crop, and could not totally prevent it.

II. DEPARTURE FROM NORMAL TEMPERATURE AND RAINFALL FOR LAFAYETTE, IND., FROM APRIL TO AUGUST, 1896.

	Temperature, Degrees F.	Rainfall. Inches.
April	+6.8	−0.97
May	+7.7	+0.70
June	−0.7	−0.29
July	+0.2	+7.05
August	−0.57	+0.64

III. TEST WITH FORMALIN.

One-hour Treatment.

		Untreated.	Formalin 1-1200.	Formalin 1-800.	Formalin 1-400.	Formalin 1-200.
Number of hills harvested		136	61	68	67	67
Per cent. of tubers with	Whole surface scabbed	1.13	.32	1.06	0	.0
	Half surface scabbed	7 09	10.10	7.14	3.82	2.23
	Few scattered spots	54.18	52.44	59.26	52.64	45.40
Per cent. of tubers entirely free from scab		37.60	37.14	32.54	43.54	52.37
Per cent. of injury from scab		10.09	10.60	10.54	7.16	5.65

By reference to Table III, the results, stated as percentages, may be seen, when the seed tubers were immersed for one hour in solutions of formalin of various strengths. With this length of immersion a solution having one part of formalin to 1,200, or even 800 parts of water, had no practical effect; but a strength of one to 400 reduced the scab materially, and a strength of one to 200 reduced the injury (not loss of market value, but proportion of crop scabbed; for further explanation see below) to nearly one-half, the greater part of which consisted of small scattered spots, the tubers being almost free of large areas of scab.

In Table IV the results are shown when the treatment was extended to two hours, together with the results of the standard corrosive sublimate treatment, all being strictly comparable. It will be seen that the treatment in every instance decreased the amount of scab, and that formalin of a strength of one to 200, applied for two hours, was considerably more effective than even corrosive sublimate as generally used. The results of this treatment are illustrated in Plate 1.

The fact that both tables show conclusively that the stronger and longer the application of formalin the less scab in the crop, leaves no doubt about formalin being a preventive of scab. And the additional fact that

IV. TEST WITH FORMALIN AND CORROSIVE SUBLIMATE.

Two-hour Treatment.

		Untreated.	Formalin 1-1200.	Formalin 1-800.	Formalin 1-400.	Formalin 1-200.	Corrosive Sublimate 1-1000.
Number of hills harvested		128	65	70	66	70	131
Per cent. of tubers with	Whole surface scabbed	.34	.0	.0	.0	.0	.19
	Half surface scabbed	7.20	7.55	2.19	5.84	1.17	1.51
	Few scattered spots	50.41	46.41	53.91	44.15	31.38	33.83
Per cent. of tubers entirely free from scab		42 05	46.04	43.90	50.01	67.45	64.47
Per cent. of injury from scab		8.96	8.42	6.49	7.34	3.72	4.33

with suitable treatment the results equal or exceed those obtained under equally favorable conditions with corrosive sublimate makes it reasonably certain that it is a fungicide against scab that is the equal or superior in efficiency of any known. The further fact that the treatment does not perceptibly injure the germination and growth of the tubers, as was well shown in the greenhouse trials, together with its nonpoisonous and noncorrosive character, makes it without doubt a remedy for potato scab that meets all demands.

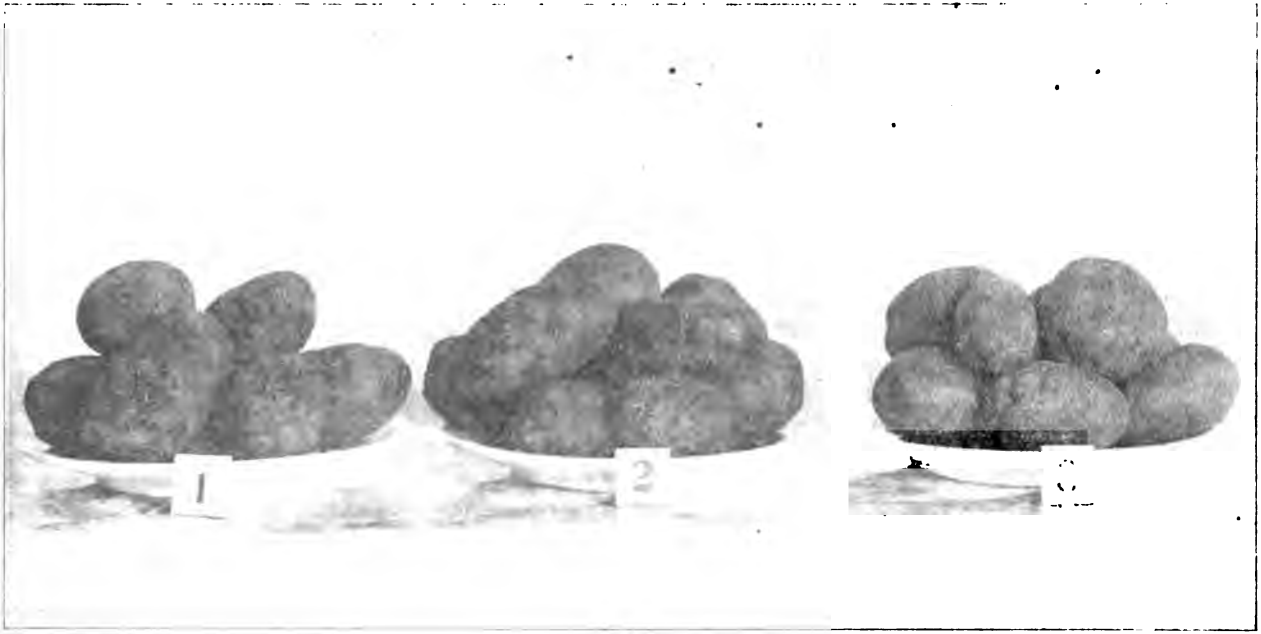
Use of Formalin on "Clean Seed."—Experiments of the kind here described are not undertaken with the view of benefiting the slovenly, indifferent or indolent cultivator. Such a person will continue in the future as in the past to put seed into the ground in the least troublesome way, and to ascribe all defects of the crop to the weather, soil or a mysterious providence. But it is to the man who is willing to exercise care and apply knowledge in order to realize an additional margin of profit that the new remedy here advocated is especially commended. The careful man will be interested to learn that it is not only inferior and conspicuously scabby seed material that gives good results upon treatment with formalin, but almost any seed material, even that which is seemingly "clean," that is, free from noticeable scab spots, will show improvement in the crop from its application.

A field trial was made in which the seed material was of the best quality, such as would be acceptable to any cultivator. There were no scab spots large enough to attract attention, and the tubers would probably have passed the inspection of even a fastidious cultivator as free of scab. That the tubers did bear the germs of the disease, however, was clearly shown by the sequel. The potatoes were grown on the Station grounds, and were of the Burbank variety. They were treated two hours to a bath in a solution of formalin of the strength of 1:400, and were planted with one potato uncut in a hill, in the same kind of soil as in the experiments previously mentioned. The results are shown in Table V. It is to be borne

V. FORMALIN TREATMENT WITH HIGH QUALITY SEED TUBERS.

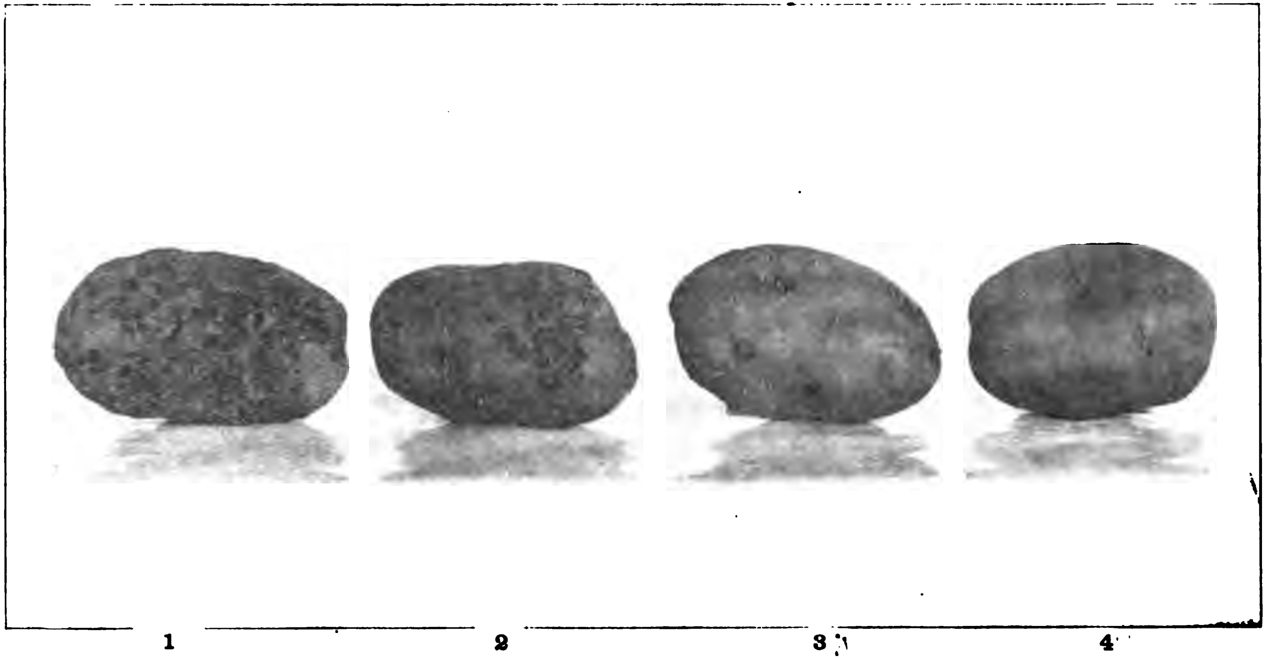
Potatoes planted consisted of smooth, seemingly scab-free tubers.

		Untreated.	Formalin 1-100, 2 hrs.
Number of hills harvested		278	555
Per cent. of tubers with	Whole surface scabbed	.10	.0
	Half surface scabbed	1.42	.49
	Few scattered spots	34.32	28.75
Per cent. of tubers entirely free from scab		64.16	70.76
Per cent. of injury from scab		4.24	3.12



FORMALIN TREATMENT FOR SCAB.

1. Shows the condition of tubers used for seed material. 2. Quality of the crop from untreated tubers. 3. Quality of crop from tubers treated two hours to formalin of strength of 1 to 200.



GRADING FOR SCAB.

Four grades of potatoes, rated as: 1, whole surface scabbed; 2, half surface scabbed; 3, few scattered spots; 4, free from scab.

in mind that the soil in which this trial was made was laden with scab germs from previous crops, and most of the 3.12 per cent. of injury in the crop from treated seed can be reasonably ascribed to this source. The crop as a whole was improved 1.1 per cent. by the treatment, and there was an increase of 6½ per cent. in the number of tubers entirely free of scab spots. The increase in the value of the crop, enough to much more than pay for labor and cost of treatment, must be wholly ascribed to the use of the formalin.

Increase of Scab by Moisture.—It has long been known, and since the beginning of experimental inquiry definitely settled, that moisture in the soil promotes scab. It is probable, however, that the extent to which this action takes place is not always fully appreciated. An experiment was carried out this season on ground that for most purposes would be rated as level. The rows of potatoes were about 25 rods long, running north and south. The south half of the piece was probably eight inches higher on an average than the other half, and the gravel subsoil came much nearer to the surface. Whenever it rained much the water would stand for hours on the north half, but drain away at once on the south half. The deep, black loam of the north half also remained moister at all times than the shallow soil of the south half. In the accompanying table (VI), the percentage of scab in the crop from the south (dry) half is compared with that from the north (moist) half of this piece of ground, the seed material for both being of good and inferior quality and treated and untreated. In each instance the crop gave more tubers entirely free from blemish due to scab on the south (dry) half than on the other, and a correspondingly less percentage of injury from same cause. It is noticeable that the crop was much more affected with scab in both dry and moist soil when the seed material was scabby than when ordinarily exempt.

The full significance of this experment can only be apprecated when it is borne in mind that the plat of ground used was so nearly level that its unevenness would usually attract no attention, even when designed for experimental purposes. There is no considerable variation in level for more than three-quarters of a mile in any direction, and no trees, buildings, or other obstructions are near enough to affect the soil moisture. The soil over the whole plat has had uniform tillage for many years.

A somewhat closer inspection of the table will show that on this piece of ground, so insignificantly uneven, the injury from scab on the moister half, was nearly one-third greater than that on the drier half, averaging the whole plat. The experiment can best be turned to account as a reminder of the caution that is needed to carry out plat experiments in a way to secure reliable and comparable data.

VI RELATION OF SOIL MOISTURE TO SCAB.

	Seed Tubers Seemingly Free From Scab Burbank.				Seed Tubers Thickly Covered With Deep Scab. State of Maine.			
	Untreated.		Formalin 1-100, 2 hours.		Untreated.		Corrosive Sublimate 1-1000, 2 hours.	
	Dry.	Moist	Dry.	Moist.	Dry.	Moist.	Dry	Moist.
Number of hills harvested	139	139	277	278	128	136	131	133
Per cent. of tubers with Whole surface scabbed	.22	.0	.0	.0	.33	1.18	.18	.0
Per cent. of tubers with Half surface scabbed	1.11	1.69	.59	.40	7.20	7.09	1 51	2.38
Per cent. of tubers with Few scattered spots	26 47	40.97	22.81	33.86	50.41	51.18	33.83	42.13
Per cent. of tubers entirely free from scab	72.20	57.34	76.60	65.74	42.06	37.60	64 48	55.49
Per cent. of injury from scab	3.42	4.94	2.58	3.59	8 97	10.09	4.32	5.40

Method of Estimating Injury from Scab.—Exact methods are advantageous in any kind of experimental work. In most cases of plant diseases it is difficult to arrive at an exact statement of the amount of injury or loss due to the disease—that is, wheat rust, corn smut, etc. In the case of smut of small grains, the method of counting the stalks, introduced by the writer in 1884, and now generally adopted, has proved very serviceable and reasonably exact.

In the case of potato scab the most diverse methods are used, even by investigators in the experiment stations, and no two appear to estimate alike. In all cases the results are greatly wanting in precision. The ordinary cultivator estimates by simple inspection as the potatoes lie upon the ground when dug. It is doubtful if any difference under 10 per cent. can be detected in this way, if, indeed, as much as that. The last station bulletin that has come to hand on potato scab (R. I. No. 40) shows careful and thoughtful work. The potatoes were separated into "tubers free from scab," "tubers scabbed" and "tubers badly scabbed." The statement is made in the summary that the standard corrosive sublimate treatment was "utterly useless where the soil was favorable to the disease and where it was already badly contaminated." All the work at this Station, as well as the simple logic of the case, goes to show that with an accurate method of determining the results some difference must have been found in favor of treated over untreated seed, even in a heavily contaminated soil. The statement of "utterly useless" may be true in a practical or economic sense, but in an exact or experimental sense it is obviously lacking in precision. Any number of instances could be taken from station literature to show the need of more exact methods of determining the amount of scab.

It is believed that the method devised and used in the botanical department of this Station approaches more nearly to the standard required than any which has come to the writer's attention, and it is therefore described in some detail for the benefit of other experimenters who may care to make use of it in whole or in part.

The potatoes are dug, if possible, at a time when the soil will not adhere much to the tubers. The crop is separated into four grades:

1. Tubers with whole surface scabbed (pl. 2, fig. 1).
2. Tubers with half surface scabbed (pl. 2, fig. 2).
3. Tubers with few scattered spots (pl. 2, fig. 3).
4. Tubers entirely free from scab (pl. 2, fig. 4).

Each hill is examined and recorded separately. At the same time that the inspection is made for scab the number of large tubers (weighing 50 grams or more) and their combined weight, and the number of small tubers (under 50 and above 7 grams) and their combined weight, are also taken and recorded for each hill. This matter of the number and weight often provides valuable accessory data, even when not an essential feature of the experiment.

To arrive at a single figure as an expression of the extent to which the scab prevails in the crop, the first three of the above data are combined. As the scab is a surface disease, it is assumed that the injury is in proportion to the amount of the surface of the tuber covered. Furthermore, the assumption is made that in No. 1 the whole surface is covered, which is, of course, in a literal sense, only approximately true, but from an economic point of view true enough, that in No. 2 it is half covered, and in No. 3 it is one-tenth covered. By adding the number obtained under No. 1, half that of No. 2 and one-tenth that of No. 3 together, each being in form of percentage, a figure is obtained which fairly represents the percentage of injury to the crop by scab.

The figure thus obtained may or may not represent the loss of market value, for much will depend upon the manner of assorting for market, much upon the fastidiousness of the buyers, etc. And yet it is believed that it comes nearer to a fair statement of actual money loss than any figure heretofore used, that can be derived directly from primary data. At any rate, it seems to represent the percentage of injury to the crop with reasonable accuracy, and in lieu of better data may be taken as the percentage of loss in market value.

Efficiency of Formalin under Farm Conditions.—Many cultivators are disinclined to put the methods recommended by experimenters into practice as too encumbered with niceties and unsuited to the every-day methods of the farm. Having strong faith in the efficiency of the new fungicide, from the indications derived from the greenhouse tests, it was thought worth while to take the testimony of a number of practical potato growers, in order to judge how the remedy would be likely to work in the hands of the ordinary cultivator, and also to be able to reinforce the recommendation of the Station from wholly unprejudiced sources, should the fungicide prove valuable.

Four cultivators, known to be successful potato growers, were asked to co-operate with the Station. They were not told what the material was which was sent them, only that it was supposed to be a new fungicide and not poisonous. They were asked to put the amount of material sent into a certain amount of water (calculated to make a solution of the strength of 1:400), and immerse the seed potatoes in it for two hours, and if possible to plant so as to compare with the standard corrosive sublimate treatment and with untreated seed. In order that the reader may have all the data, the replies are given in full. The first is from the eminent agriculturist, Mr. T. B. Terry:

"Hudson, O., September 19, 1896.

"Prof. J. C. Arthur:

"Dear Sir—We have dug the potatoes. We selected last spring some of the worst scabbed tubers we could get, those just covered all over. Then we made the test on land that we knew was free from scab. The seed treated with your mixture gave us entirely perfect tubers in every instance. They grew all right, no delay about coming up. The scabbed tubers planted without any treatment gave us a crop slightly marked, usually one to four spots on a tuber. They were not as bad by any means as on seed planted. I am most sorry they were not, but there was enough so that I found the place by looking at the tubers before I hunted up the stakes. Usually badly scabbed seed gives us a crop about as bad. There was a little spot in the field where the trouble has long been in the soil, and there the scabs were thick enough, in spite of treated seed. Of course this is but a single trial, but as far as it went it indicates that your material is all right.

"T. B. TERRY"

"Ockley, Ind., October 31, 1896.

"Prof. J. C. Arthur:

"Dear Sir—The potatoes treated with the material sent by you gave satisfactory results. The tubers from the rows we treated were free from scab, while those from the rows not treated were somewhat scabby. As far as this one year's experience goes, it has been as effective as the corrosive sublimate treatment.

"A. HOADLEY."

"Lafayette, Ind., November 16, 1896.

"Prof. J. C. Arthur:

"Dear Sir—I tried your treatment for potato scab with the following results: Treated seed gave 8 per cent. of slightly scabby tubers, untreated 12 per cent. grading from slightly scabby tubers to those that were completely covered. The treated and untreated seeds were planted in alternate rows upon the ground that was in potatoes the year before. I think the results very satisfactory, considering the season, which was remarkably favorable for scab development, and the fact that the germs were in the ground from the previous crop.

"WM. M. RESER."

Although Mr. Reser's postoffice address is Lafayette, yet he lives a number of miles in the country, and is not often able to visit the Station. In a recent brief interview he confirmed the opinion expressed in his letter, and stated that he found the new material somewhat less pleasant to handle than corrosive sublimate, as the solution made his hands smart if there were any sore or raw spots on them. His percentages were obtained by counting part of the crop as a basis for the total estimate.

The fourth person was Mr. J. H. Skinner, an undergraduate student of Purdue University, living at Romney, not far from Lafayette. He reported as follows:

"The potatoes were treated according to directions and then alternate rows were planted with the treated seed. The land had not had potatoes upon it preceding this crop, but has been under cultivation for several years. The season was an unfavorable one on account of the extreme wet weather, which caused a part of the potatoes to rot. The potatoes were dug about the middle of September, and on comparing the potatoes which came from the treated seed with those from the untreated, there was a noticeable difference, but they were not free from scab; as to the per cent. of decrease, I am unable to state. And, as we had no potatoes treated with corrosive sublimate, I am unable to compare the two.

"J. H. SKINNER."

These four reports show beyond question that the new fungicide is as efficient in farm practice as corrosive sublimate, and probably as efficient as any preventive applied to the tubers is likely to be, handled as it must be on the farm.

Although the work extends over only one season, it has been so uniformly successful that there is no hesitancy in recommending the treatment without reserve. At the State Fair at Indianapolis, in September, plates of potatoes were shown, illustrating the efficiency of the new fungicide (Plate 1), and printed slips bearing the following recipe were distributed:

> Treatment.—Add one-half pint of formalin (40 per cent. strength) to 15 gallons of water, and soak the seed tubers in it for two hours; then cut and plant. Formalin is a colorless and perfectly harmless liquid.

The operation is so simple that no further directions are needed. The strength here recommended is about 1:260 (that is, about one part of formaldehyde to 650 of water), which is considered strong enough for general use, being a little stronger than that used in the farm trials this season, although not quite so strong as that used in part of the experiments at the Station. The material is more conveniently purchased by the ounce, rather than the pint, a half pint containing about eight fluid ounces. It is usually put up in pound bottles, which retail for $1.25 or less. The price is dropping on account of its increasing use as an antiseptic and general germicide. A pound bottle holds about 15 fluid ounces, or nearly one pint, the 40 per cent. solution being considerably heavier than water. Most pharmacists will sell it by the pound, or the fluid ounce, as desired.

Although no tests have been made to ascertain the number of times that the same solution may be used and still be effective, yet for a number of reasons it seems safe to say that three or four lots of potatoes may be dipped successively into the same bath before renewal, especially if the tubers are quite free from dirt. It will be well, however, to lengthen the time somewhat for the last one or two lots.

SUMMARY.

Formalin, a nonpoisonous, noncorrosive substance, will practically free seed potatoes of scab germs by an immersion for two hours in a solution of the approximate strength of 1:300.

It is equal to corrosive sublimate in efficiency, and is without its dangerous and troublesome properties.

The treatment is simple and inexpensive, and results in a decided improvement in the crop.

Seed material of seemingly good quality, as well as that much affected with scab, shows beneficial results from treatment.

(For experimental purposes the need of caution in selecting ground on account of variation in moisture is pointed out, and a more exact method of estimating injury from scab described.)

Corroborative testimony of the value of the new fungicide in field culture is given by four cultivators.

The recipe for its use is to add eight fluid ounces (about one-half pint) of formalin to 15 gallons of water and soak the seed tubers in it for two hours before planting. This solution may be used more than once.

BIBLIOGRAPHY.

Some of the literature on the germicidal, therapeutic and physiological action of formalin. There has been no attempt to make this list of references exhaustive, but it includes such as were readily accessible. It is given to assist the reader in understanding the present state of knowledge regarding this new economic agent, and to reassure him of its nonpoisonous character, as well as to aid subsequent investigators.

1888.

Loew, Physiologische Notizen über Formaldehyd. Ber. Ges. Morph. u. Phys. zu, München, 1888. Bacteria were killed in 1 per cent. solution, but molds lived in a solution of same strength for some time.

1889.

Buchner and Segall, Ueber die gasförmige antiseptische Wirkung des Chloroforms, Formaldehyds und Kreolins. Münch. med. Wochenschr., 1889.

1892.

Aronson, Ueber die antiseptischen Eigenschaften des Formaldehyds. Berlin. klin. Wochenschrift, 1892.

Berlioz and Trillat, Sur la proprietés des vapeurs du formol ou aldéhyde formique. Compt. Rendu, vol. 115. 1892.

Trillat, Sur la proprieté antiseptique de la formaldéhyde. Compt. Rendu. vol. 114. 1892.

1893.

Blum, Formaldehyd als Antiseptikum. Münch. med. Wochenschr. 1893.

Gegner, Ueber einige Wirkungen des Formaldehyds. Dissertation, Erlangen. 1893.

Kuch, Ueber den Einfluss von Aldehydlösungen auf die Lebensthätigkeit der Pflanzen. Dissertation, Erlangen. 1893.

Lehmann, Vorläufige Mitteilungen über die Disinfektion von Kleidern, Buchern, Bursten, Kämmen, etc., mit Formaldehyd. Münch. med. Wochenschrift, 1893.

Schild, Formalin zur Diagnose des Typhusbacillus. Centr. f. Bak. u. Par., vol. 14, 1893.

Stahl, Formalin. Pharm. Zeit., 1893.

1894.

Ascoli, Sul potere desinfettante della formalina. Milano, 1894.

Behring, Die Bekämpfung der Infektionskranheiten. Leipzig, 1894.

Cambier and Brochet, (Production of gaseous formaldehyde for disinfecting purposes). Compt. Rendu, vol. 119, 1894. Abs. in Jour. Chem. Soc., 1895.

Ermengem and Sugg, Recherches sur la valeur de la formaline à titre de dèsinfectant. Arch de Pharmakodynamie, vol. 1, 1894. Abs. in Chem. Centr.-Bl., vol. 67, 1896.

Philipp, Ueber die Desinfektion von Wohnräumen durch Formaldehyd. Münch. med. Wochenschr. 1894.

Slater and Rideal, on Formaldehyd as an antiseptic. Lancet, 1894.

1895.

Bevan, The use of formalin as a preservative of milk samples. Analyst, 1895.

Burckhard, Zwei Beiträge zur Kenntniss der Formalinwirkung. Centr. f. Bak. u. Par., vol. 18, Ath. I, 1895.

Cohn, Ueber Formaldehyd und seine Wirkungen auf Bakterien. Jahr. d. schles. Ges. f. vaterl. Cultur, 1895. Abs. in Bot. Centralbl., 69, 1897.

Geuther, Ueber die Einwirkung von Formaldehydlösungen auf Getreidebrand. Ber. pharm. Ges., 1895. Abs. in Chem. Centr.-Bl., 1896. He found that the spores of species of Ustilago and Tilletia were killed after treatment for two hours in a .1 per cent. solution of formalin without injury to the seed grain. With a concentration of .25 per cent. the seed was injuriously affected.

In the discussion which followed the presentation of this paper before the German Pharmaceutical Society Krüger stated that in his experiments spores of Ustilago Carbo were not killed by immersion for twenty-four hours in a .05 per cent. solution of commercial formalin. The germination of seeds of the cereals, however, was not impaired by treatment for twenty-four hours with solutions of the concentration, according to species, of 05—.1 per cent. of rye .2 per cent., but there was injury when the concentration was increased to .2—.4 per cent.

Gottstein, Ueber die Einwirkung der Dämpfe des Formaldehyds auf die Keimfähigkeit von Pflanzensamen. Hyg. Rundschau, vol. 4. Abs. in Chem. Centr.-Bl., 1895. Found that peas exposed some days to the fumes of 10 per cent. formalin lost their germinating power.

Pottevin, (Investigations on the antiseptic value of formaldehyd). Ann. Inst. Pasteur, vol. 8. Abs. in Chem. Centr.-Bl., 1895.

Rideal, On formalin as a milk preservative. Analyst., 1895.

Thomson, Relative efficiency of various preservatives in milk. Rep. Glasgow City Anal. Soc., 1895. Abs. in Analyst., 1896.

Thomson, Preservative value of formaldehyde and its detection in milk. Chem. News, 1895.

Schepilewsky, Formaldehyd als Desinfektionsmittel. Dissertation, St. Petersburg, 1895. Abs. in Chem. Centr.-Bl., 1896.

Wahl and Henius, Formaline in the brewery. Am. Brew. Rev., vol. 9, 1895.

Weigle and Merkel, Die Einwirkung des Formalins auf Nahrungsmittel. Forschungs-Ber., 1895, in Chem. Zeit., 1895. Abs. in Analyst., 1895.

1896.

Bird, The properties and uses of formaldehyde. Pharm. Jour., 1896. Also Amer. Jour. Pharm., Nov., 1896. A general account, with qualitative and quantitative tests for its detection. A table gives the purposes for which it has heretofore been employed, and the proportions recommended for each case.

Bosc, (Disinfection experiments with formaldehyde gas by Trillat's method). Ann. Inst. Pasteur, vol. 10. Abs. in Chem. Centr.-Bl., 1896.

De Smet, Revue intern. méd. et chir., 1896. Abs. in N. Y. Med. Jour., 1896. "In a 1 per cent. solution formaldehyde exerts a slightly caustic action, which is shown by a blanching of the mucous membrane. In a 5 per cent. solution it produces a veritable burning of the mucous membrane, but this action is transitory and causes no inconveinence."

Hehner, The detection of formalin. Analyst., 1896.

Horton, Disinfection of books by formalin vapor. Med. News, 1896. Abs. in Med. Standard, Nov., 1896. Disinfection takes place in fifteen minutes in an atmosphere of one part of formaldehyde gas to 300 parts air, without slightest injury to the books.

Hurty, Formaldehyde: the new germicide and tissue preservative. Indiana Med. Jour., Dec., 1896. A general account of the nature and uses of formalin, especially for disinfection of rooms and clothing. Recommends the use of the Robinson lamp for generating the gas.

Hurty, A cheap disinfectant. Indianapolis Journal, Sunday, Dec. 6, 1896. Description of a simple device for generating formaldehyde gas. It consists of a heavy brass tube containing two sections of wire gauze suspended over a common alcohol lamp, in which ordinary commercial alcohol is burned. It is claimed that this form of lamp will produce formaldehyde gas rapidly enough "to penetrate every corner of a room and thoroughly disinfect it in five minutes."

Rosenberg, (Further uses of formaldehyde). Deutsche med. Wochenschr., 1896. Abs. in Med. News, 1896. A 60 per cent. solution of formaldehyde in methyl alcohol, to which a small amount of menthol is added, has been given the name holzinol. It is found to be germicidal in solutions of 1:75,000, and can be employed the same as formalin. It has the advantage of being without the irritating action of the latter.

Roux and Trillat (Disinfection experiments with formaldehyde gas). Ann. Inst. Pasteur, vol. 10. Abs. in Chem. Centr.-Bl., 1896.

Solis-Cohen, Some new topical agents in the treatment of tuberculosis of the larynx. N. Y. Med. Jour., 1896. Applications of 1 per cent. formalin, increased to 10 per cent., were used with highly beneficial results, the parts having been first cocainized to prevent the painful burning sensation.

Walter, Zur Bedeutung des Formalins, bezw. Formaldehyds als Desinfektionsmittel. Zeit., Hyg., vol. 21. Abs. in Chem. Centr.-Bl., 1896.

Weems and Heileman, Studies on milk preservatives. Bull. Iowa Exper. Station, No. 32, 1896.

Setchell and Osterhout, Some aqueous media for preserving algæ for class material. Bot. Gaz., vol. 21, 1896. Comparison of chrome alum, formalin, and camphor water. "We have found that the 1 to 2 per cent. solution of the formalin makes a solution sufficiently powerful to kill, fix, and preserve any ordinary vegetable tissue."

1897.

Alexander, An ideal germicide, deodorant, and antizymotic, possessing the same germicidal power as corrosive sublimate without its toxicity. N. Y. Med. Jour., Jan., 1897.

Lilly, Formaldehyde. A pamphlet of thirty-six pages without title page, date or name of author. Contains much valuable historical and general information, and also reports of experiments upon the germicidal action of the gas. Primarily an advertisement for a new form of gas generator, using wood alcohol.

Bolley, New studies upon the smut of wheat, oats and barley. Bull. N. D. Exper. Station, No. 27, March, 1897. Gives results of numerous germination tests after treating these grains with various strengths of formalin, and of formalin and corrosive sublimate combined. By field experiments it was found to be effective against smut. Recommends use of 1 pound of formalin to 50 gallons of water, to be sprinkled on seed grain and the pile shoveled over until thoroughly wet. "It is found that such grain is much benefited and improved in germinating power by this chemical."

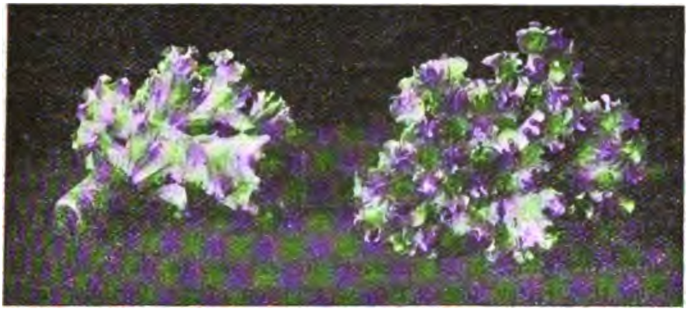
ADDENDUM.

The manuscript of this bulletin was completed in December, 1896. As the winter passed and the printing was still delayed, a short newspaper bulletin (No. 43, dated February 26, 1897) was prepared and given to the periodical press, stating the nature of the discovery and the practical method of utilizing it. Its publication aroused much interest, and brought inquiries for further information from a large number of residents of the State, and also from many other persons in all parts of the country.

The result has been that the new remedy is being tested upon the crop of the present season under widely varying conditions and by cultivators of different degrees of skill. An early consensus of opinion, therefore, is likely to be reached upon the practical value of the new remedy.

The rapid growth in popularity of formalin as a general germicide has caused a great increase in the number of the published articles relating to the subject. Only a few references have been added to the bibliography, however, since the completion of the manuscript, as it is believed to be sufficiently comprehensive for the purposes of this bulletin.

Lafayette, Ind., June 14, 1897.



BULLETIN NO. 66. VOL. VIII. OCTOBER, 1897.

INDOOR LETTUCE CULTURE.

BY WILLIAM STUART.

Within the last decade the winter forcing of lettuce in greenhouses has become an industry of no inconsiderable magnitude. This is especially true in the vicinity of large cities where it is a common thing to see acres of glass devoted to the culture of this vegetable alone. Indoor lettuce culture is not, however, restricted to large cities, for glass structures are to be found in the vicinity of nearly all the smaller towns, devoted wholly or in part to the culture of lettuce.

In this industry, as in every other which has assumed any magnitude, numerous experiments have been tried in order to determine the best cultural methods to be employed. The style of house and bench best adapted to the growth of lettuce have each, in their turn, received the attention of practical men in the business, as well as that of experiment station investigators. The questions of chemical fertilizers and subwatering have also recently attracted the attention of lettuce growers and experimenters.

I. CHEMICAL FERTILIZERS AS SUBSTITUTES FOR BARNYARD MANURE.

The advantages to be derived from the use of chemical fertilizers over that of manure may be best answered under the following heads: (1) It enables us to apply the fertilizing ingredients most needed for the proper development of the plant, and in a form which is quickly available to it. (2) The labor of applying it is much less than that of the manure. (3) It lessens the chances of introducing injurious fungous diseases into the soil and houses.

It is a well-known fact that potash, phosphoric acid and nitrogen are three elements essential to the growth of plants, and that as a rule the soil is deficient in one or more of these elements. The best method, therefore, is to select one or more forms of chemical fertilizers representing each of the above mentioned elements, and apply them separately and in combination with each other, to a soil deficient in plant food. The results will generally be indicative of the particular element most needed by the plant.

Deeming this problem of sufficient importance to warrant careful investigation, the writer, under the supervision of Dr. Arthur, undertook a series of experiments in the station greenhouses during the winter of 1896-97, looking toward its elucidation. Some preliminary work with lettuce the previous season in which fertilizers had been used, furnished the writer with data, which was turned to some account in the work now contemplated.

A bench, three feet nine inches by nineteen feet was fitted up especially for the experiment, being so constructed as to permit of subwatering. This bed was divided into six sections, of which the four inner ones were exactly three feet in length, the two end ones being a little longer.

The soil used in filling the bench was of a black loam, obtained from a plat of ground which had grown various crops, but had not received any fertilizer for a number of years, and so was assumed to be quite deficient in plant food. Previous to being put in the bed it was passed through an eighth-inch wire mesh screen, after which it was thoroughly mixed by shoveling. This insured a soil of uniform character in the several sections. The bench was then filled to a depth of six inches. For convenience of reference the six sections of the bed are numbered from I to VI, and in referring to them these numbers will be used.

The kinds of fertilizers used and the amounts are as follows:

Section I. None.

Section II. Muriate of potash; at the rate of 1,026 pounds per acre.

Section III. Muriate of potash and nitrate of soda; the former at the same rate as in II, the latter at the rate of 1,503 pounds per acre.

Section IV. Muriate of potash and dissolved bone black; the former at the same rate as in II and III, the latter at the rate of 1,503 pounds per acre.

Section V. Muriate of potash, nitrate of soda and dissolved bone black; at the same rate as in the others.

Section VI. None.

The ordinary commercial fertilizers were used, their approximate value being as follows:

Muriate of potash = 50. per cent. potash.
Nitrate of soda = 16. per cent. nitrogen.
Dissolved bone black = 16. per cent. phosphoric acid.
Plus .6 per cent. nitrogen.

I. AMOUNT OF FERTILIZER APPLIED TO EACH SECTION.

No. of Section.	Muriate of Potash.	Dissolved Bone Black.	Nitrate of Soda.
I	None	None	None.
II	119.936 grams	None	None.
III	119.936 grams	None	175.679 grams.
IV	119.936 grams	175.679 grams	None.
V	119.936 grams	175.679 grams	175.679 grams.
VI	None	None	None.

The fertilizers were distributed evenly over the surface of the soil, and then, by means of a trowel, were thoroughly incorporated with it.

The variety of lettuce selected for the experiment was the Grand Rapids, it having been found better adapted to the conditions which must necessarily prevail in a house devoted to the cultivation of a variety of plants, than that of the White Seeded Tennisball, which had previously been used.

Method of Growing and Handling the Plants.—The seed was sown in a flat, September 19, 1896, and the seedlings potted off into 2¼-inch pots. October 12, the soil used in potting the plants being similar to that used in the bench. During the time the plants were grown in pots, or from October 12 to November 10, they were watered in the ordinary way. On the latter date they were removed from the pots and planted in the bed. All plants which were either above or below the average size were rejected, only those which were of a uniform size being used. The plants were set six by six inches apart each way. From the time of setting in the bed until harvested they received no surface watering. It should be said that previous to setting the plants in the bed the soil was made uniformly moist by means of subwatering, and this condition was through judicious watering maintained throughout the experiment. It is obvious that with such conditions, the value of a fertilizer test is greatly enhanced. The application of water from below prevented any waste of plant food by washing it out of the reach of the plant, as is frequently the case with surface watering. On December 3 the plants of each section were measured, the average results of which are given in Table II.

II. AVERAGE HEIGHT OF PLANTS IN DIFFERENT SECTIONS WITH PER CENT. OF INCREASE OR DECREASE.

	Sections I and VI.	Section II.	Section III.	Section IV.	Section V.
Average height of plants in inches	2.64	2.26	2.30	3.35	3.24
Per cent. of increase or decrease ..	—	—16 81	—14.78	+26.89	+22.73

It was found that the application of potash in II resulted in a decrease in height as compared with the control of nearly 17 per cent., in No. III with potash and nitrate of soda, a decrease of nearly 15 per cent., while in No. IV, with potash and dissolved bone black, an increase of nearly 27 per cent. was obtained, No. V falling slightly lower with an increase of nearly 23 per cent. The results were exactly in accordance with the actual appearance of the plants. Photographs of Sections II and VI were taken January 11, when the plants were about two-thirds grown (see Plate III.)

Harvesting the Crop.—The crop was harvested on February 5, and the product from each section carefully weighed. The plants were cut off at the surface of the ground, no attempt being made to weigh the root system. The total weight of the product from each section, the number and average weight per plant, as well as the per cent. of increase or decrease, based on that of the control, is presented in Table III.

III. TOTAL AND AVERAGE WEIGHT OF PRODUCT PER SECTION AND PER PLANT WITH THE PER CENT. OF INCREASE OR DECREASE, BASED ON THAT OF THE CONTROL.

Section.	No. of Plants.	Total Weight in Grams.	Average Weight Per Plant in Grams.	Per Cent. of Increase or Decrease.
I and IV	56	1,268.86	22.66	—
II	42	832.80	19.83	—14.27
III	42	463.99	11.05	—105.07
IV	42	2,965.17	70.60	+211.56
V	42	3,156.11	82.29	+263.15

The results showed a surprising increase on Sections IV and V, which had received phosphoric acid, the former yielding an increase over the control of 211 per cent. and the latter of 263 per cent. On the other hand, the decrease of Sections II and III, which had not received phosphoric acid, was quite marked, the former falling a little over 14 per cent. below the control, while the latter was over 100 per cent.

The reader will be able to get a more tangible conception of the differences between the several sections by reference to the graphic chart (p. 44), in which is presented in exact proportion the relative yield of each section. A photograph was also taken at the time of harvesting, showing an average plant from each section (see Plate IV). The numbers in the plate agree with those of the sections.

It is apparent, from these results, that the addition of potash alone, or of potash and nitrate of soda in excessive amounts, proved of themselves rather injurious. The addition of dissolved bone black, however, produced conditions which appear to have been highly favorable to the growth and perfect development of the plant.

In order to test the matter still more severely, a second lot of Grand Rapids lettuce, was on February 15, 1897, transplanted directly from the seed flat into the bed. Being quite small, the plants were set four inches apart each way, no attempt being made to grow large heads. The plants were measured March 17, and the results found as a rule to coincide with those of the first crop, and for convenience of comparison the measurements of both crops are presented in Table IV.

IV. AVERAGE HEIGHT OF PLANTS IN INCHES WITH PER CENT. OF INCREASE OR DECREASE OF THE TWO CROPS.

SECTION.	Height of First Crop.	Height of Second Crop.	Per Cent. Increase or Decrease Over Control in First Crop.	Per Cent. Increase or Decrease Over Control in Second Crop.
I and VI	2 64	2 05	——	——
II	2.26	1.92	−16.81	−6.77
III	2.30	1.61	−14.78	−27.33
IV	3.35	3 82	+26 89	+86.34
V	3.34	2.95	+22.72	+43.90

A comparison of the two crops shows some variations, which in three out of the four sections denotes an increase, as compared with their respective controls, in favor of the second crop, Section III giving a greater decrease in the second than in the first crop. To state the matter more fully, Section II, which had received potash, gave a larger growth in the second than in the first instance, although still not equal to the control; while Sections IV and V, the former of which had an application of potash and phosphoric acid, and the latter of potash, nitrogen and phosphoric acid, gave a much greater increase, as estimated by their control, in the second than in the first case, Section IV being greatly in excess of that of V. It would appear from these results that the addition of dissolved bone black and potash in large quantities, to a soil containing but a moderate supply of plant food, produced conditions favorable to the rapid growth of the plant in its early stages. In each crop the plants in Section IV, which contained both these elements in excess, were considerably larger than any of the others. The increased growth of the plants in the second crop without the further addition of fertilizers, is an indication that the excessive amounts of dissolved bone black and muriate of potash produced conditions in the first crop which were not so favorable to rapid growth, but that with a removal of a portion of these elements by the first crop, the plants in the second were enabled to make a quicker growth. The increased growth of Section IV over that of V must be attributed to the fact that to the latter nitrate of soda was also added. The difference between the size of the plants of IV and V in the first crop was only slight, but in the second crop there was a marked gain in favor of Section IV. The apparent increased growth of the second crop from Sections IV and V over that of their control, as compared with that of the first crop, is an evidence that the application of excessive amounts of fertilizers to a soil produces a chemical condition which is unfavorable to a quick growth of the plant in its early stages. The results obtained from Section IV having proved superior to those from Section V, indicates that lettuce plants make a quicker growth in a soil which does not contain a large amount of nitrate of soda. The small size of the plants in Sections II and III shows that muriate of potash and nitrate of soda are apparently injurious, if used in large quantities, when a large amount of dissolved bone black is not present.

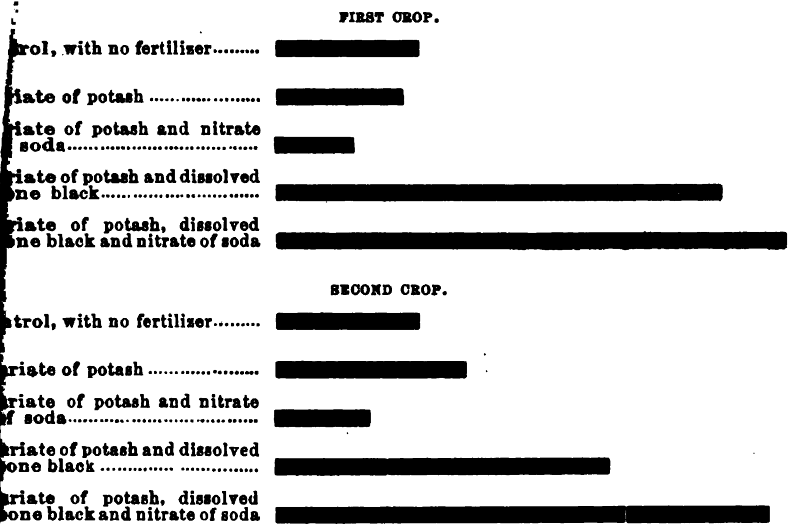
The crop was harvested April 23, and as in the preceding crop, the product of each section was weighed. The data obtained from these weights is presented in Table V, which has been arranged similar to Table III.

V. TOTAL AND AVERAGE WEIGHT OF PRODUCT PER SECTION AND PER PLANT WITH THE PER CENT. OF INCREASE OR DECREASE, BASED ON THE CONTROL.

SECTION.	No. of Plants.	Total Weight in Grams.	Average Weight Per Plant in Grams.	Per Cent. of Increase or Decrease Based On Control.
I and VI	50	650	13.00	——
II	45	739	16.42	+26.31
III	45	410	9 11	—42.59
IV	45	1390	30 89	+137.62
V	45	2012	44.71	+243.92

The second crop showed a lessened increase from the sections in which the fertilizers had been especially serviceable in the first and a greater yield from those in which they had previously been deleterious. In order to enable the reader to compare the relative yields of the two crops, a graphic chart of each of them is presented (p. 44).

PHIC CHART SHOWING THE RELATIVE YIELDS OF THE TWO CROPS, AS COMPARED WITH THEIR RESPECTIVE CONTROLS.



COMPARISON OF THE YIELDS OF THE TWO CROPS.

Having in a previous paragraph considered the variations which occurred in the growth of the plants in the earlier stages of development, and the supposed causes which produced them, it now remains to discuss the final yields of the two crops. Comparing the percentages of increase or decrease over that of the control in each crop, it will be found that in Section II, to which potash had been applied, there was a decrease in yield of over 14 per cent. in the first crop and an increase in the second of over 26 per cent.

Section III, to which potash and nitrate of soda had been applied, showed a decrease in the first crop of over 100 per cent., while in the second there was a decrease of over 40 per cent.

Section IV, having potash and dissolved bone black, gave an increase in the first crop of over 211 per cent., and in the second of nearly 138 per cent.

Section V, to which had been added all three of the above mentioned fertilizers, gave an increase in the first instance of 263 per cent. and in the second of about 240 per cent.

It is evident from the results obtained that when potash is used alone, as in Section II, and applied in an excessive amount, that is, largely in excess of the nitrogen and phosphoric acid already in the soil, it produces conditions which are unsuitable to the growth of the plant.

The conditions appear to be rendered worse when potash and nitrogen in excessive amounts are applied to a soil not containing an equally large amount of phosphoric acid. It is apparent, however, that the addition of potash and phosphoric acid in large amounts to a soil containing but an ordinary amount of nitrogen, furnishes conditions which seem to be well suited to the rapid growth of the plants. The application of potash, phosphoric acid and nitrogen, although apparently retarding growth somewhat at first, eventually produced a heavier yield than when potash and phosphoric acid were used alone.

The variations which occurred between the first and second crop may be attributed to the fact that as a portion of the excessive amounts of fertilizer were used by the first crop, their deleterious or beneficial effects were lessened in the second. For example, in Section II, having potash alone, the first crop showed a marked decrease in yield, while the second showed a very marked increase. The inference to be drawn from this is that the amount of potash contained in the soil for the second crop was not sufficient to cause any appreciable injury to the plants, but was rather beneficial to them.

In the case of Section III, containing potash and nitrogen, there was a considerable increase in yield from the second crop over that of the first, although it was still below that of the control. It is reasonable to infer in this case that the excessive amounts of potash and nitrogen were not so completely used up as was the potash in II, hence they were still present in sufficient amounts to be somewhat injurious.

In Section IV we find that the conditions are changed, and instead of having in the first crop a smaller yield than the control, one over three times as large is obtained, while in the second the increase is considerably over twice as much as that of the control. The only difference between Section IV and that of II is that the former received an application of dissolved bone black in addition to muriate of potash.

The decided increase in yield of Section IV over that of II must be attributed to the presence of the bone black. It is highly probable that the dissolved bone black in combination with the muriate of potash produced conditions quite the reverse of the potash alone, and that in this way the plant was enabled to make use of both elements. The striking increase without any application of nitrogen would seem to indicate that nitrogen, at least in the form of nitrate of soda, is not the most essential element in lettuce culture. The application of all three ingredients to Section V, while it tended to retard the growth of the plants when small, eventually gave a larger increase than from Section IV, this being especially marked in the second crop.

The increased yield obtained from Section V over that of IV is directly attributable to the application of nitrate of soda to the dissolved bone black and potash. The inference to be deduced would then be that to obtain a maximum crop, all three ingredients are necessary. It is highly probable, however, judging from the tardy growth in the early development of the plant, that the first application of nitrate of soda to the soil could best be made (in liquid form) when the plants are well established and a second application when the plants are two-thirds grown, which, in conjunction with bone black and muriate of potash, would doubtless furnish ideal conditions for the full development of the plants.

SUMMARY.

The application in large quantities of muriate of potash to a soil having a moderate amount of phosphoric acid caused a large decrease in yield in the first crop and without additional fertilizers an increase in the second.

The addition of both muriate of potash and nitrate of soda in excessive amounts caused a very large decrease in the first crop, with a less marked one in the second.

Dissolved bone black and muriate of potash, when applied in excessive amounts, gave a very marked increase in the first crop, with a considerably less marked one in the second.

The application of all three fertilizers in excessive amounts gave a very large increase in the first crop, with almost as large a one in the second.

The dissolved bone black and muriate of potash gave the plant the quickest start, as in each crop the plants in that section were considerably larger than in the others.

Phosphoric acid seems to be an essential factor in the growth of lettuce.

INVESTIGATIONS OF A SIMILAR NATURE.

So far as the writer knows, the only experiments conducted in growing lettuce under glass by the aid of fertilizers are those by Maynard[1] and Goessmann,[2] of Massachusetts, and Green,[3] of Ohio.

Maynard's Experiment.—This experiment was conducted in the greenhouse during the winter of 1888-89 and 1889-90, and consisted of a trial of several forms of fertilizers, which were applied to the soil separately in order to determine the particular form best adapted to the needs of the plant.

The forms of fertilizer used the first season were muriate of potash, sulphate of potash, nitrate of soda, sulphate of ammonia and dissolved bone black. Of these, sulphate of ammonia gave the best results in the first crop and nitrate of soda the poorest. In the second crop, which was grown in the same soil without the addition of extra fertilizers, the dissolved bone black gave the best results and nitrate of soda the poorest.

For the second season's work the old soil was replaced by new and the same fertilizers with the addition of nitrate of potash, were used. In this trial the sulphate of ammonia gave the best results and the dissolved bone black the poorest. From this it would appear that nitrogen applied in the form of sulphate of ammonia gave the best results, while in the form of nitrate of soda it gave the poorest.

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[1] Bull. No. 10 Hatch Ex. St., pp. 4-5, 1890.

[2] Eleventh Ann. Report Mass. Ex. St., pp. 247-254, 1893.

[3] Tenth Ann. Report Ohio Ex. St., p. XXX, 1891.

In the absence of any data to explain whether the plants were grown until fully developed, as well as from the fact that no fertilizers were used in combination with one another, makes it impossible to compare the results with those obtained by the writer, other than to note the ill-effect produced by nitrate of soda, which coincides with that already noted in this bulletin.

Goessmann's Experiment.—The scope of this experiment was much more comprehensive than the former in that it included a larger number of fertilizers, which were combined in various ways. These fertilizers were applied to a soil containing very little plant food. In all the trials, however, some form of nitrogen, phosphoric acid and potash was used, hence it cannot be determined which of these three elements was the most essential to the growth of the plant. Of the various combinations used, it was found that carbonate of potash-magnesia, double superphosphate and nitrate of soda gave the best results; and that muriate of potash, dissolved bone black and sulphate of ammonia gave the poorest. It was found that the muriate of potash combination did not produce results at all equal to that of the carbonate of potash-magnesia combination. To one section out of the twelve used in this experiment, the same three ingredients were applied as to that in Section V recorded by the writer, in which dissolved bone black, muriate of potash and nitrate of soda were used. Owing to the fact that Goessmann did not allow the plants in this section to come to maturity, the results cannot be accurately compared with those here given. As no mention is made of a control section for comparison, it is impossible to say whether any of the fertilizer combinations actually gave a less or a greater yield than would have been obtained from the unfertilized soil.

Green's Experiment.—This was an experiment to test the value of nitrate of soda and sulphate of ammonia as nitrogenous fertilizers for lettuce culture under glass. As none of the details of the experiment is given, except to state the form of fertilizers and the kind of soil used, no profitable comparison with our own work can be made. His main conclusion was that nitrogenous fertilizers applied to a rich compost produced wholly negative results.

II. MOISTURE AND ASH DETERMINATIONS.

In order to ascertain whether the percentages of moisture and ash had any relation to the yield of the plants or to the fertilizers used, several mature plants were taken February 15, 1897, from Sections I, II, III, IV and V, all of which, except I, had received fertilizers in some form, as already stated. The moisture determinations were made in the customary way by weighing the plants as soon as they were removed from the soil, and then drying them in a drying oven until no further loss of moisture occurred. The difference in the weights was then taken and the percentage of moisture estimated therefrom. The ash determinations were made from the air-dry material obtained in the moisture determinations. The method was as follows: A gram or less of the material was weighed out in a porcelain crucible of known weight, and held in a slow flame until the whole mass was charred. It was then removed from the flame, and allowed to cool somewhat; and boiling distilled water was then added to dissolve out the soluble salts. After standing for some time, the contents were poured upon a high grade filter, and by frequent washings with hot water the soluble contents were washed through and collected in a beaker, or other suitable vessel. The precipitate and filter were then put in the crucible and dried in the drying oven, after which they were incinerated over a slow flame at first, and afterwards in a blast flame. After cooling the crucible and contents in a desiccator it was weighed on an analytical balance, and the difference in the two weights of the crucible minus the known ash of the filter paper represented the weight of the insoluble ash. The filtrate was evaporated to dryness in another crucible on a sand bath, and carefully heated to a dull red over a slow flame. After cooling in a desiccator, it was weighed as in the first case and the amount of soluble ash or salts obtained. The sum of the insoluble and soluble residue represents the percentage of ash. No attempt was made to analyze the ash.

For convenience of reference a table is given showing the average weight of the plants from each section and the percentage of moisture and ash in each. The results obtained show a relationship between the yield as represented by total weight and the percentage of moisture and ash in the plant; that is, the more vigorous the growth of the plant the greater the percentage of moisture and ash.

VI. AVERAGE WEIGHT OF PLANTS IN EACH SECTION IN GRAMS AND THE PERCENTAGE OF MOISTURE AND ASH.

	Section I.	Section II.	Section III.	Section IV.	Section V.
	Control.	Potash.	Potash and Nitrate of Soda.	Potash and Dissolved Bone Black.	Potash, Nitrate of Soda and Dissolved Bone Black.
Average weight per plant	22.66	19.83	11.05	70.60	82.29
Per cent. of moisture	96.22	96.35	95.34	97.63	98.18
Per cent. of ash	21.72	23.86	22.54	24.19	24.37

III. RESTRICTED VS. NONRESTRICTED ROOT GROWTH.

In March, 1895, a bulletin[4] was issued by the New York Experiment Station in which was described a method of forcing lettuce in pots. It was claimed that by transplanting the plants directly from the seed bed into two-inch pots, and then when the plants were large enough to plunge the rims of the pots about half an inch below the surface of the soil in the bench in which they were to be grown, one transplanting instead of two was sufficient. The special advantages claimed in favor of pot-grown plants were that they formed a more compact head, they could be marketed without disturbing the roots, and that as plants were removed, others could at once be set in their places. The question naturally arose whether plants grown in pots and plunged in the soil would become as large as those whose roots were not restricted, and also whether the product was superior, hence with a view of ascertaining what differences would occur between the two methods of culture, a bench thirteen feet long and three feet nine inches in width, which had been previously fitted up with tile for subwatering, was devoted during the winter of 1895-96 to this experiment. The White-seeded Tennisball and Grand Rapids lettuce were the varieties first tried, the seed being sown October 14, and the seedlings pricked out[5] October 30. Those designed for the restricted root-growth test were potted into 2½-inch pots, while those intended for unrestricted root growth were pricked out into flats.[6] Special attention was given to the watering of the plants in pots previous to their being transplanted into the bed, in order to insure them as uniform a water supply as those in the flat. On November 18 the plants were measured and the average height of the pot-grown plants of the White-seeded Tennisball was found to be 1.634 inches, while that of those in the flat was 2.065 inches, a gain in favor of the latter of nearly 21 per cent. The average height of the Grand Rapids pot-grown plants was 2.666 inches, while that of those in the flat was 3.045 inches, a gain in favor of the latter of about 12.5 per cent.

VII. AVERAGE HEIGHT OF PLANTS IN POTS AND FLATS, IN INCHES.

White Seeded Tennisball.		Grand Rapids.	
In Pots.	In Flats.	In Pots.	In Flats.
1.634	2.065	2.666	3.045

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[4] Bulletin 88 N. Y. Ex. Sta., pp. 133-138, 1895.

[5] "Pricked out" is a gardener's term used to denote the first transplanting of seedlings

[6] Shallow boxes usually from 2½ to 3 inches deep and of any size to suit the fancy of the grower.

The day following that of taking the measurements the plants were set in the bed, at a distance of 7½ by 8 inches. During the early portion of their growth in the bed subwatering was practiced, but in the latter portion surface-watering had to be resorted to on account of the imperfect distribution of the water through the tile, caused by too great a leakage at some of the joints.

Weight of the Crop.—The crop was harvested January 29, 1896, and the plants of each lot carefully weighed. The average weight of the pot-grown White-seeded Tennisball was 48.76 grams per plant, while those not grown in pots averaged 60.32 grams, a gain in favor of the latter of over 23 per cent. The pot-grown plants of the Grand Rapids averaged 107.22 grams per plant, while those not grown in pots averaged 154.80 grams, a gain in favor of the latter of over 44 per cent.

Some difficulty was experienced in growing the White-seeded Tennisball, owing to the tendency of the young leaves to die at the tips about the time they began to head. The low weight of the head is largely attributable to this fact.

In order to obtain more data it was thought best to repeat the experiment. Accordingly, shortly after harvesting the first crop, a second one was set out. In this test only the Grand Rapids lettuce was used, it having proved so much better adapted to the condition of the room in which it was grown.

A slight modification was made in the experiment. Instead of pricking one lot of plants into flats and the other into pots, as in the first case, both lots were potted. When they were set in the bed, February 10, 1896, half of the plants were removed from the pots and planted in the ordinary way, while the remainder of the plants were plunged with the pots in the soil as in the first crop. The cultural conditions were as nearly like the first as possible, except that all watering was done on the surface. No measurements were made, as the plants were all of the same size when set in the bed. The crop was harvested March 31, and as in the previous case, gross and average weights of the plants were obtained. The average weight of the pot-grown plants was found to be 150.6 grams, while that of those not in pots was 203.03 grams, a difference in favor of the latter

VIII. AVERAGE WEIGHT OF PLANTS WITH RESTRICTED AND NON-RESTRICTED ROOT GROWTH, AND PERCENTAGE OF GAIN OVER THE FORMER.

		White Seeded Tennisball.	Grand Rapids.
First crop	Restricted	48.76 grams	107.22 grams.
	Non-restricted	60.32 grams	154.80 grams.
	Gain	23.71 per cent	44.38 per cent.
Second crop	Restricted		150.60 grams.
	Non-restricted		203.03 grams.
	Gain	-	34.81 per cent.

of over 34.81 per cent. In Table VIII the average yield of the plants in each crop is given in order to enable the reader to compare the results more closely.

The gain in favor of nonrestricted root-growth being greater in the first than the second crop, it would seem to imply that the second transplanting from the seed-pan to the flat, and later from that of the flat to the bed, is preferable to potting them, even though the pots are removed when they are planted out.

It has been shown by the above experiment that the plants forced in pots do not attain a size at all equal to those not so grown. If this be true, then unless the product is placed before the consumer in such a condition as to command a higher price than that of the latter, the grower is the loser. It is claimed that by growing the plants in pots they may be marketed without disturbing the roots. This assertion can hardly be said to be true, as most of the feeding roots, if not all, will be found to have grown out into the soil surrounding the pot, and with the removal of the pot they are broken off. The thing that it does do is to permit of the removal of the plant with a compact ball of earth attached to the old roots, which, if made moist and wrapped in oil paper, will aid in keeping the plant from wilting. The writer believes that with a little care, practically the same amount of soil will remain on the roots of plants from which the pots were removed on transplanting into the bed, provided a trowel is used in lifting them. If this be true, then there can be no question of the superiority of the latter method, because of the increased weight of the plant, amounting to over 30 per cent. In a recent bulletin by R. L. Watts,[7] on "Pot Culture of Lettuce," the writer says that he obtained a difference of 15 per cent. between restricted and nonrestricted root-grown plants.

IV. THE BEST DISTANCE TO SET PLANTS.

The amount of space to accord plants in growing lettuce is usually governed by the demands of the market for which it is intended. In the East, where the plants are sold at so much per dozen heads, the grower is obliged to set his plants further apart than his brother tradesman in the West, because the latter sells his plants by weight, and the question of the individual size of the heads is therefore of less importance. The grower, therefore, must be guided by the demands of his consumers. The Eastern grower usually sets his plants at a distance of eight inches apart, each way, and in some cases, if the variety grown forms large heads, as much as ten inches of space is given. The Western grower, on the other hand, is seeking to obtain the greatest weight per area and so sets his plants much closer, usually giving them a six-inch space each way, or even less.

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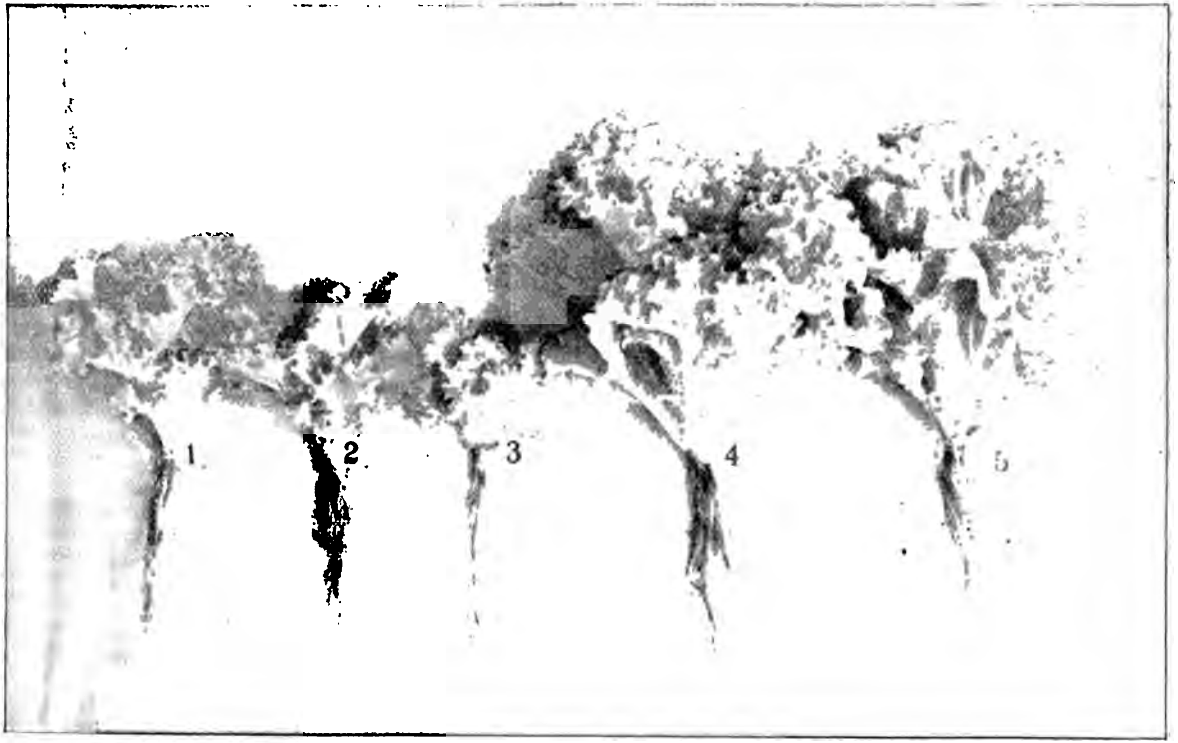
[7] Bull. Tenn. Ex. Sta., Vol. X, No. 2, 1897.



AN AVERAGE PLANT FROM EACH SECTION, FIRST CROP.

1. Grown without fertilizer. 2. Grown with potash. 3. Grown with potash and nitrogen.
4. Grown with potash and phosphoric acid. 5. Grown with potash, nitrogen and phosphoric acid.

Having some experience in growing lettuce for the Eastern markets, the writer felt inclined to the belief that plants set eight inches apart would, if given good cultural attention, yield quite as much weight per square foot, as if planted more closely. In order to test the matter, a comparison of plants grown six and eight inches apart was made during the winter of 1895-96. The result of this comparative test was very much in favor of the close planting, a yield of 567 grams per square foot being obtained from those set six inches apart, as against 313 grams from those eight inches apart, making a gain in favor of the former of over 80 per cent. It should be said, however, that the plants were marketed when those set six inches apart were commencing to crowd each other for space, hence those set eight inches apart had not grown as large as they probably would have done if allowed to remain longer.

V. LOSS FROM BLEEDING.

The usual method of removing the plants from the soil when they are ready for shipment is, in the Middle and Western States, to cut them off at the surface of the ground. In the East they are pulled up by the roots, and any adhering soil is washed off. It seemed to the writer that the former method would entail more or less loss from bleeding than that of the latter, and, in order to determine it, a number of plants were cut off at the surface of the ground, while an equal number were pulled, both lots being weighed. They were then washed and prepared in the usual way for market, after which they were allowed to remain in a warm room for six hours. At the end of that time they were weighed again, with the result that their last weight in both cases proved greater than the first, owing to the fact that the water applied to the foliage in washing them had not dried off. The difference between the two lots of lettuce was slight, those which were cut off at the surface showing an increase of 7.09 per cent. over the first weight, while those that were pulled showed an increase of 6.02 per cent. The difference was so slight that it could easily be attributed to a slightly greater amount of moisture adhering to the leaves of the former.

The only indication given by this experiment is that it matters little which method is practiced, especially if the plants are sufficiently mature, when probably little bleeding occurs.

VI. SUBWATERING.

The question of subwatering has only recently come into prominence as one possessing sufficient merit to warrant careful investigation by those engaged in greenhouse work, especially in vegetable forcing.

The method of subwatering first employed at this Station was by means of lines of tile laid parallel with each other in the bottom of a water-tight bench, by means of which the water was distributed through the soil. In the fall of 1893 a bench 13 feet long and 45 inches in width was fitted up in the manner described, having four lines of three-inch tile running parallel with the bench, these lines being connected with a cross-line at each end, so as to form a continuous circuit. As the joints were covered with cement and the ends of the cross-lines stopped with the same, this made the distribution of the water to take place through the porous tile from which it was taken up by the soil. The water was poured in by means of a vertical tile connecting with the end line. An overflow through the bench was provided at the opposite end so that the tile could only be filled two-thirds full. After a three years' trial of this system of subwatering, during which carnations had been grown for two seasons and lettuce the remaining one, it was abandoned. The reason for discarding it was that it was found to be impossible to obtain an even distribution of water throughout the bed, an especially necessary condition in experimental work, and also to maintain a water-tight bench with matched lumber. In fact, during the last season, it was only used a portion of the time during the growth of the first crop of lettuce, because of the uneven distribution of water through the soil. In the fall of 1896 the bench which had been used for subwatering was remodeled and enlarged, both in depth and length, the former being increased from 8 to 11 inches and the latter from 13 to 19 feet. A new system of subwatering, a modification of the one which had been in use by the Wisconsin Experiment Station for two seasons, was substituted for the tile. The details of this new style of watering (see Fig. 1) are as follows: A zinc pan, three or four inches deep, and of the same dimensions as that of the inner surface of the bed to be used, was placed on the bottom of the bench, the sides of the pan being provided with two overflows at a height of 1½ inches from the bottom. A solid layer of soft bricks set on edge was placed in the bottom of the pan (c), and sufficient soil put upon them to fill the bed. The bricks serve as transmitters of the water to the soil. Provision for running the water into the pan was made by placing four tubes vertically at equal distances along the inner side of the bench, resting upon the pan below (b). The lower edges of the bricks were chipped off in the vicinity of the tubes, in order to form small channels for the freer distribution of the water.

A few changes have been made this season which so far are considered decided improvements. Instead of only chipping the lower edges off a few bricks near the conduits, all the bricks in the bench were so treated. This forms channels for the free distribution of the water over the entire pan, which in the first case had to be absorbed more or less by the bricks and transmitted from one to the other. Another change made was in putting in two water gauges (a). By means of the gauges water can be run in to a certain level each time, and by having one near each end of the bed it is possible to tell if both stand on the same level, and also when all the water has been absorbed.

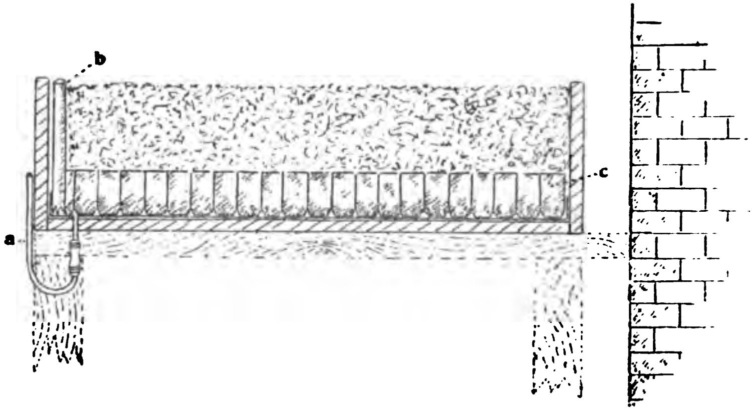


FIG. 1.—Cross-section of bench for subwatering, standing out from the wall four inches: *a* water gauge, *b* vertical tube for conveying water to the pan, *c* layer of brick, standing on the zinc-lined bottom and supporting the soil above.

The results of a season's trial of this system of watering, and also from observations on its present working, the writer has no hesitancy in recommending it as being an exceedingly efficient method of distributing the water evenly.

Cost.—It may be urged by commercial growers that such a system of subwatering would be much too expensive to be adopted by them, therefore it has been deemed advisable to give the expense of fitting up such a bed as the one just described, which contains a superficial area of 71.25 square feet. The first item is that of a zinc pan, which cost $7. The second item is that of 500 soft brick at 45 cents per hundred, $2.25, making a total of $9.25 or about 13 cents per square foot. It is quite probable that with an increased area the attendant expense of fitting up a bench would be considerably lessened. To offset the seemingly large outlay involved at the outset, there would be (1) the benefits accruing from an increased yield in product grown, varying from 25 to 35 per cent., arising from a more uniform distribution of moisture, and less losses from leaf disease; (2) less labor is involved on subwatered benches than on surface-watered ones, because the soil does not require as frequent stirrings; (3) the average duration of the greenhouse bench would be more than doubled, because, by using the pan, very little moisture comes in contact with the wood; (4) with reasonable care, a zinc pan will last six or seven years and possibly much longer, while the brick can be made to do a much longer service. With these advantages it would seem that the additional outlay at the outset is more than counterbalanced, and that the grower is amply repaid for it. In all probability the increased yield obtained in one season's work would more than repay the additional outlay.

History of Subwatering.—The first recorded experiment in subwatering was made by E. C. Green and W. S. Turner, assistants in the horticultural department of the Ohio Experiment Station in 1890,[8] with a view of ascertaining if such a method of watering might not prevent lettuce rot. The results of these first trials, and of extended subsequent experiments by the same persons, are known chiefly through the writings of W. J. Green,[9] horticulturist of the Ohio Experiment Station, and W. R. Lazenby,[10] horticulturist of the Ohio University, under whose respective supervision the work was done. In the first trial a few plants were set in a box in which a tile was so placed as to admit of watering without wetting the foliage, which were compared with plants watered in the ordinary way. The result of the trial was so favorable to the subwatered plants as to justify its further use. Accordingly, two benches 7½ by 10 feet were constructed out of matched lumber, put together with white lead, so as to form water-tight joints. Crosswise of these benches 2½-inch tile were laid 2½ feet apart, holes being bored through the sides of the bench to admit the hose in watering. Two benches of similar size were reserved for a comparative test between surface and subwatered plants. The results obtained from the subwatered benches were so superior to the surface-watered ones that the following season a greater area was devoted to subwatering. With this increase there came also some modifications in the construction of the benches. It was found that it was practically impossible to construct a water-tight bench out of matched lumber, even though white lead was freely used in the joints, so cementing the bottom of the bench was substituted. This, though superior to the first, did not prove entirely satisfactory, owing to the tendency of the boards to warp or spring sufficiently, when filled with soil, to cause the cement to crack. This led to further changes in which benches of slate with iron supports came to be adopted; the cement being used on the slate as with the boards, and the tile laid lengthwise of the benches, the end tile of each line being connected with a vertical one projecting above the bed to admit the hose in watering. Comparative tests between surface and subwatered plants showed a gain of about 40 per cent. in favor of the latter.

Another method of subwatering is that reported by F. W. Rane,[11] in Bulletin 33 of the West Virginia Experiment Station. In this experiment, iron and lead pipes were used instead of tile, the water being distributed by means of punctures every four inches in the sides of the pipes. Comparative tests were made with surface and subwatered benches, which were strongly in favor of the latter. Professor Rane found that the punctures in the iron pipes were liable to clog with rust and thus prevent a uniform distribution of water. With the lead pipe this difficulty was somewhat obviated, but its increased cost practically placed it out of the reach of the commercial grower. The only distinctive advantage the lead pipes have over tile is that they do not occupy as much space and so do not require such deep benches. Comparative tests made between surface and subwatered beds showed a gain in favor of the latter of 25 per cent.

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[8] Ohio Exper. Sta., Bull. 61, p. 60, 1892.

[9] Tenth Ann. Rep. Ohio Exper. Sta. for 1891, p. XXX; Ohio Exper. Sta. Bull. 43. pp. 101-02, 1892; same, Bull. 61, pp. 57-76, 1895.

[10] Proc. Soc. Prom. Agric. Science for 1893, pp. 59-63.

[11] Bull. 33 W. Va. Ex. Sta., pp. 255-268, 1893.

The last and latest system of subwatering of which the writer has any knowledge is that adopted in 1894 by Goff and Crandall,[12] of the Wisconsin Experiment Station. This system has some features connected with it which should commend it as being somewhat in advance of anything heretofore attempted along the line of subwatering in the greenhouse. The special features of this new method of subwatering are: (1) The employment of brick as water conductors; (2) securing a water-tight bench by lining the bottom of the bench and a portion of the sides with galvanized iron, the joints being soldered so as to form a water-tight pan. The pan was filled with soft brick set on edge, and supplied with water from a tank overhead by means of a rubber tube which extended into the pan at one corner. The required depth of soil being placed on the bricks, water was admitted to the pan, absorbed by the brick and taken up from them by the soil by capillary attraction. The comparative tests made by Goff and Crandall between surface and subwatered plants showed a gain of about 25 per cent. in yield in favor of the latter; there was also a noticeable gain of from eight to ten days in earliness. As the methods of subwatering practiced at this Station have already been described in a previous portion of this bulletin, no special mention will be made of it here.

Comparing the first and last system of subwatering, it would seem that the cost of constructing such a bench as that finally adopted at the Ohio Station would be considerably more than the cost of an ordinary greenhouse bench with a zinc or galvanized iron pan. The greatest difference, however, is in the distribution of the water in the one case by tile, in the other by a solid flooring of porous brick, which distributes it uniformly throughout the bench. With the substitution of brick for tile in cement-lined slate benches, the conditions would be just as ideal as that of the other. The only difference would be in the cost of construction.

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[12] Thirteenth Ann. Report of the Wisconsin Ex. Sta., pp. 243-251, 1896.

BULLETIN No. 67, VOL. VIII. DECEMBER, 1897.

WHEAT AND CORN, SEPARATE AND IN COMBINATION, AS FOOD FOR PIGS.

BY C. S. PLUMB AND W. B. ANDERSON.

This experiment had for its purpose a comparison of the feeding value of corn and wheat, singly or in combination, when fed to growing, fattening pigs. This involved a consideration of several points of importance, all of which had a direct bearing on the experiment.

The pigs used were farrowed October 20, 1896, were high-grade Chester Whites, and the product of two pigs that were full sisters. Each sow had nine pigs, and the two litters were very uniform and furnished unusually good material for experimentation. They were placed in the experiment soon after weaning.

Sixteen of the pigs, or eight from each litter, were divided into four lots of four pigs each, consisting of three barrows and one sow in each lot.

The foods fed were as follows, with skim milk:

Lot 1. Corn.
Lot 2. Wheat (dry).
Lot 3. Corn and wheat (half and half).
Lot 4. Wheat (soaked).

The grain was fed whole, in regular pig troughs resting on platforms in small pig lots, and in the case of Lot 4, the wheat, after being weighed out, was soaked for twenty-four hours in cold water up to the last of March, after which it was soaked only twelve to fourteen hours, that the wheat might be fed unfermented. In addition to the grain ration, each lot was fed daily, about 1 p. m., from ten to twelve pounds of separator skim milk, the amount being ten pounds per day up to March 6, and thereafter twelve pounds daily, each lot receiving the same amount.

Each lot of four pigs was confined in small enclosures of about 350 square feet, which includes the small house in each, which was not much larger than the needs of the pigs.

The corn fed was a yellow dent grown on the Station farm, and part of the wheat was also grown on the farm, though much of it was of inferior grade, bought at the elevator. It is important to note here that, while the purchased wheat was of inferior grade in quality, before being fed it was run through the fanning mill and cleaned of all foreign matter. Chemical analysis showed no difference in feeding value of the wheat used.

The pigs were fed grain twice daily—about 7 a. m. and 4 p. m.

The pigs were divided into four lots, as uniformly as possible, on January 1, and fed until January 9, the foods used all during the experiment, which began on January 9. As the pigs were weighed at weekly periods, the general experiment, which covered 105 days, extended over fifteen weekly periods. During this time a careful record was kept of the food eaten daily by each lot, and no increase in ration was made, excepting at the beginning of a new period.

With the view of noting at what apparent age these pigs would lay on flesh to the best advantage from the economical standpoint, they were not fed all they could have digested, at least during the first two-thirds of the feeding, after which the grain ration was increased to full feeding capacity.

The sixteen animals were generally in good health all during the experiment, excepting that No. 107 of the corn-fed lot, on March 9, was taken suddenly with nausea at night, but rapidly recovered, while No. 120 of the soaked-wheat lot, on March 27, was affected with scours. In fact, the pigs fed soaked wheat seemed somewhat inclined to free action of the bowels, though not seriously so.

The following table shows the total amount of food of each kind fed to the four pigs of each lot, during the several periods, with the grand total for the 105 days complete:

TOTAL AMOUNT OF FOOD EATEN PER PERIOD PER LOT.

PERIOD.	Lot I—Corn.		Lot II—Wheat.		Lot III—Corn and Wheat.		Lot IV—Wheat (Soaked).	
	Corn, Lbs.	Skim Milk, Lbs.	Wheat, Lbs.	Skim Milk, Lbs.	Corn and Wheat.	Skim Milk, Lbs.	Wheat, Lbs.	Skim Milk, Lbs.
I	44.00	70	44.00	70	44.00	70	44.00	70
II	54.50	70	54.50	70	54.50	70	54.50	70
III	64.50	70	64.50	70	64.50	70	64.50	70
IV	84.00	70	84.00	70	84.00	70	84.00	70
V	84.00	70	84.00	70	84.00	70	84.00	70
VI	84.00	70	84.00	70	84.00	70	84.00	70
VII	98.00	70	98.00	70	98.00	70	98.00	70
VIII	112.00	70	112.00	70	112.00	70	112.00	70
IX	123.75	82	126.00	82	126.00	82	126.00	82
X	126.00	84	126.00	84	126.00	84	126.00	84
XI	126.00	84	126.00	84	126.00	84	126.00	84
XII	140.00	84	140.00	84	140.00	84	140.00	84
XIII	140.00	84	140.00	84	140.00	84	140.00	84
XIV	154.00	84	154.00	84	154.00	84	154.00	84
XV	154.00	84	154.00	84	154.00	84	154.00	84
Total for 105 days	1,588.75	11.46	1,591.00	11.46	1,591.00	11.46	1,591.00	11.46

An examination of this table shows that each lot ate practically the same amount of food during the experiment, as weighed out at the trough.

If the amount of food fed is reduced to absolutely digestibly dry matter, we then find that the following amounts of digestible water-free material have been consumed:

Lot 1.	1,523.28 pounds corn and milk.
Lot 2.	1,531.60 pounds wheat and milk.
Lot 3.	1,528.50 pounds corn, wheat and milk.
Lot 4.	1,531.60 (?) pounds wheat and milk.

Undigested Food.—It is important at this point, in discussing the amount of digestible food eaten, to consider one important feature in the consumption of grain fed. In each lot of pigs more or less whole grain passed through the digestive organs and out in the excrement. This was mainly wheat, though a few entire kernels of corn passed through. Many broken grains also passed. The excrement was so rich in grain that the pigs ate it as fast as voided. In fact, the soaked-wheat lot soon discovered the food material in their excrement, and carefully watched each other so as to secure as soon as possible any fresh excrement passed off.

To give the reader an idea to what an extent the grain was carried unbroken through the digestive organs, the following figures are submitted. Three samples weighing five ounces each were taken from the excrement of each lot of pigs, and the undigested grains counted in each. The following are the figures secured:

Lot 1.	Corn.	Averaged 7 whole grains in each 5 ounces.
Lot 2.	Wheat (dry).	Averaged 1,167 whole grains in each 5 ounces.
Lot 3.	Corn.	Averaged 685 whole grains in each 5 ounces.
Lot 3.	Wheat.	Averaged 12 whole grains in each 5 ounces.
Lot 4.	Wheat (soaked).	Averaged 1,003 whole grains in each 5 ounces.

How much of this whole grain was digested? The writers believe that feeding tables showing amount of digestible food consumed have little significance in a case like this. Unquestionably a large amount of food would be lost were the pigs to eat it but once, food that ordinarily would be regarded as digested, yet which in truth was not.

To ascertain if a passage through the digestive tract injured the germinative power of the whole wheat, a number of kernels of grain from each lot were placed in a seed germinator. Of these, 4 per cent. of those of the dry-wheat lot germinated, showing little apparent injury, while none of the soaked-wheat lot showed vitality.

The result of the feeding of this grain convinces us that whole wheat is fed at an unjustifiable loss, and that it should at least be well broken or crushed before being fed to pigs.

The weights of the pigs were taken each Saturday, and it is proper to state that a good gain in weight was made in each case.

The following table shows the individual gains of each animal:

Pigs.	Weights.		Total Gain in 105 Days.	Daily Gain.
	January 9.	April 24.		
Corn Fed—	Lbs.	Lbs.	Lbs.	Lbs.
No. 107	45¼	174	128¾	1.22
No. 108	42¾	157	114¼	1.08
No. 109	46¾	167	120¼	1.14
No. 122	50	174½	124½	1.18
Wheat—				
No. 110	43½	169½	126	1.20
No. 113	39	140½	101½	.96
No. 117	42¾	153	110¼	1.05
No. 119	48½	144	95½	.91
Corn and Wheat—				
No. 106	38	153½	115½	1.10
No. 112	37¼	130	93¾	.89
No. 116	46¾	182	135¼	1.28
No. 118	51½	180½	129	1.22
Wheat (Soaked)				
No. 111	49½	164	114½	1 09
No. 114	46	157	111	1.05
No. 115	44¾	151½	106¾	1.01
No. 120	49	160	111	1.05

The total weekly gains for each lot are shown in the following table:

TOTAL WEEKLY WEIGHTS OF EACH LOT, IN POUNDS.

Period and Date.	Lot I, Corn.	Lot II, Wheat.	Lot III, Corn and Wheat.	Lot IV, Wheat (Soaked).
January 9	184¾	173¾	173½	189¼
January 16	192½	184½	187½	197
January 23	210½	203	205½	211
January 30	246	230	234	240
February 6	269	258½	268	264
February 13	293½	279½	290	288
February 20	327	308½	323	315
February 27	358	326	337	336
March 6	391½	366½	377½	372½
March 13	414	383½	410½	404½
March 20	461	415½	440½	433
March 27	505	456½	481½	468
April 3	526½	469	504	500
April 10	580	528	557	548
April 17	628	567½	602½	586
April 24	672½	607	646	632½
Total gain	487¾	433¼	472½	442¼
Average daily gain for 105 days	4.64	4.12	4.05	4.21
Average daily gain per pig	1.16	1.02	1.12	1.05

These figures show that the corn-fed lot made the largest gain, the corn-and-wheat lot the next largest, while the soaked-wheat lot was third, and dry-wheat fourth. The pigs of Lot 1 gained 1.16 pounds daily; of Lot 2, 1.02 pounds; of Lot 3, 1.12 pounds, and of Lot 4, 1.05 pounds. These are satisfactory gains and show that the sixteen pigs kept up a good growth all through the experiment.

The cost of the gain in weight is naturally the most important subject. The following values are placed upon the foods fed, as based on Lafayette prices:

Corn, 40 cents per hundred.
Wheat, $1.25 per hundred.
Skim milk, 8 cents per hundred.

The price for skim milk is unusually low, and it is generally regarded as worth from 15 to 20 cents per hundred pounds for feeding, but as we paid but 8 cents per hundred, this is the value given.

Of course the reader must realize that the figures given are those which would result if one had to buy in the open market. Where the farmer grows his own feed, then the cost of the meat production should not be nearly so great, especially in those regions where the soil is fertile and commercial fertilizers are not used.

The following table shows the relation of the value of food and cost of gain:

COST OF FOOD AND GAIN.

FOOD EATEN AND PRICE.	Lot I.	Lot II.	Lot III.	Lot IV.
1,588¾ lbs. corn at 40c. per 100 lbs	$6 35			
1,591 lbs. wheat at $1 25 per 100 lbs		$19 89		
1,591 lbs. corn and wheat, half and half			$13 12	
1,591 lbs soaked wheat				$19 89
1,146 lbs. skim milk at 8 cts per 100 lbs	92	92	92	92
Total value of food per lot	$7 27	$20 81	$14 04	$20 81
Pounds of gain made per lot	487¾	433¼	472½	442¾
Cost per pound gain per lot in cents	$1 49	$4 57	$2 97	$4 70

These figures show that, at current market values of foods, it cost,

To produce one pound of pork from corn, 1.49 cents.
To produce one pound of pork from wheat, 4.57 cents.
To produce one pound of pork from corn and wheat, 2.97 cents.
To produce one pound of pork from wheat (soaked), 4.70 cents.

In this experiment it required 3.12 pounds of dry matter to make one pound of gain with the corn-fed pigs, 3.55 pounds with the wheat-fed in both lots, and 3.23 pounds with the corn-and-wheat-fed lots.

If we consider simply the grain fed, we find that it required, leaving the skim milk out of consideration:

To produce one pound of gain, 3.25 pounds of corn.
To produce one pound of gain, 3.67 pounds of wheat (dry).
To produce one pound of gain, 3.59 pounds of wheat (soaked).
To produce one pound of gain, 3.36 pounds of corn and wheat.

The amount of skim milk eaten by each pig daily, however, was so small that it probably will not materially affect these figures, and they may be regarded as not far from correct. Each pig received about a quart of skim milk per day, and this cost the Station about one-quarter of a cent.

Physiological studies were made of three pigs of each lot. They were taken to the slaughter house of the Dryfus Packing House, of Lafayette, where each animal was killed and carefully cut up, and the carcass, hair, blood, intestinal fat, heart, gall bladder, kidneys, liver, lungs, spleen, leaf lard and tongue were weighed. The large and small intestines were both weighed and measured in length. The stomach was also weighed, but unfortunately with contents, so that the records concerning this organ are unsatisfactory and are set aside in this consideration.

The records secured, however, in the slaughter test do not seem to have any special significance, and no conclusions can be drawn from them showing that one food had any influence superior to the other on these pigs. If at all, the records show the corn-fed lot to have the largest development of vital organs, while in intestinal fat, blood and size of large and small intestines they have some advantage, especially as relates to the latter. In amount of leaf lard the soaked-wheat lot was the superior one.

Careful comparisons were made of uniform cross-sections of the carcasses of the different animals, but no substantial differences in appearance could be seen by the writers or others assisting in the post mortems. Series of photographs were taken of these cross-sections, but they really teach the observer nothing.

Tests were made of the strength of bone in the shoulder, through the kindness of Prof. W. F. M. Goss, of the Mechanical Engineering Laboratory, to whom the thanks of this department are herewith rendered. The two arm bones were removed and submitted to boiling sufficient to remove all flesh. These bones were then placed in a testing machine and subjected to a test of their crushing strength. Separate tests were made of each bone in each animal. Generally speaking, the result of these tests show that the bone of the corn-fed lot crushed most readily, while those of the soaked-wheat lot crushed hardest. The principal feature of interest was that the bone of the corn-fed pigs seemed appreciably softer than those of the other three lots.

The following short table shows the average crushing strength of the bones of each lot, as secured by Prof. Goss:

Lot.	Ulna.		Radius.	
	Crushing Strength.	Crushing Strength Per Square Inch of Section.	Crushing. Strength.	Crushing Strength Per Square Inch of Section.
Corn fed	750.0	8,074.6	1,636.6	6,815.3
Wheat (dry)	808.3	2,976.3	1,670.0	7,160.6
Wheat (soaked)	1,105.0	3,725.6	1,865.0	7,623.6
Corn and Wheat	969.6	3,480.0	1,691.6	7,000.3

SUMMARY.

1. Pigs fed exclusively shelled corn for grain, in cold weather, made a gain per day of 1.16 pounds.

2. Pigs fed whole wheat (dry) for grain made a gain of 1.02 pounds per day, while those fed soaked whole wheat gained 1.05 pounds.

3. Pigs fed corn and wheat whole, half and half, gained 1.12 pounds per day.

4. To produce one pound of live pork with shelled whole corn cost 1.49 cents.

5. To produce one pound of live pork with dry whole wheat cost 4.57 cents, while it cost 4.69 cents if the same kind of wheat was soaked.

6. To produce one pound of gain with the pigs fed a mixture of half and half whole shelled corn and whole wheat it cost 2.97 cents.

7. The influence of the food on the organs and fleshy parts of the body did not seem to be materially different.

8. Where corn was fed exclusively the bone was softer than where either wheat alone or corn and wheat were fed together.

REPORT

ON

FARMERS' INSTITUTES

Under the Auspices of Purdue University School of Agriculture, for the Institute Season of 1897-8.

The Ninth Institute season opened November 24, 1897, and closed February 19, 1898. Institutes were held in every county of the State according to the schedule given below. For each of the five years closing with the present one Institutes have been held in every county of the State according to schedules carefully prepared in the Superintendent's office. So far as the Superintendent is able to learn, this record has not been duplicated in any other State. In view of the small appropriation for Institute work in Indiana as compared with the provision for such work in other States the record made is one of which all Hoosiers may be justly proud.

From the very inception of this work an earnest and systematic effort has been made to conduct it along lines that would be most thoroughly helpful to farmers. There has been a steady growth in the work from the first, but so quietly has this work been performed that those who are not in close contact with it can hardly realize what has been accomplished. In at least four-fifths of the counties the work has gained a firm foothold. With rare exceptions the most substantial farmers are now glad to be identified with the Institute work. There are, of course, some fluctuations. Sometimes an inefficient chairman, failure to properly advertise the meeting, bad weather, notable trial in court, or the holding of some other meeting on the same days has interfered with the success of the work. Nevertheless, as a whole, this work is more strongly entrenched now than ever before.

Attention is called to the brief reports from the secretaries and assigned speakers in the following pages. It is hoped that the officers and speakers will peruse these reports with care. By so doing it is believed that all will find suggestions that will help to improve the work in future.

An especially encouraging feature of the attendance is the fact that the women and young folks of the country are attending the Institutes in large numbers. In the early history of the work the audience was composed largely of gray-haired men. Now it is quite the rule for the middle-aged and young people to be in the majority.

The accompanying schedule gives, for each county, the time and place of meeting, assigned speakers and the county chairman. Following the regular schedule is a list of the additional Institutes held under State auspices during the current year.

SCHEDULE OF FARMERS' INSTITUTES FOR THE SEASON OF 1897-98.

NOVEMBER.

Place of Meeting and Chairman of Institute.	Date.	Assigned Speakers.
Brown, Nashville	Wednesday, 24th	A. O. Lockridge, Mrs. F. E. Ross.
H. B. Miller, Nashville	Thursday, 25th	" "

DECEMBER.

Place of Meeting and Chairman of Institute.	Date.	Assigned Speakers.
Floyd, Edwardsville	Monday, Nov. 29	Cal. Husselman, H. E. Van [Deman.
H. Garot, Edwardsville	Tuesday, Nov. 30	" "
Harrison, Corydon	Wednesday, Dec. 1	" "
J. S. Pfrimmer, Breckinridge	Thursday, Dec. 2	" "
Washington, Salem	Friday, Dec. 3	H. E. VanDeman, S. H. Todd.
W. B. Lindley, Salem	Saturday, Dec. 4	" "
Orange, Orleans	Monday, Nov. 29	S. H. Todd, J. B. Burris.
W. H. Talbott, Orleans	Tuesday, Nov. 30	" "
Lawrence, Bedford	Wednesday, Dec 1	" "
R. B. Scott, Bedford	Thursday, Dec. 2	" "
Monroe, Bloomington	Friday, Dec. 3	J. B. Burr's, Cal. Husselman.
G. P. Campbell, Bloomington	Saturday, Dec. 4	" "
Perry, Branchville	Monday, Nov. 29	Jas. Riley, H. F. McMahan.
William Cherry, Adyeville	Tuesday, Nov. 30	" "
Spencer, Chrisney	Wednesday, Dec. 1	" "
P. A. Atkinson, Midway	Thursday, Dec. 2	" "
Warrick, Boonville	Friday, Dec. 3	" "
M. M. Rice, Boonville	Saturday, Dec. 4	" "
Daviess, Washington	Monday, Nov. 29	A. O. Lockridge, Mrs. J. C. Erwin.
R. H. Bell, Washington	Tuesday, Nov. 30	" "
Pike, Winslow	Wednesday, Dec. 1	" "
M. L. Heathman, Glezen	Thursday, Dec. 2	" "
Vanderburgh, School No. 6	Friday, Dec. 3	" "
Albert Kamp, Cypress	Saturday, Dec. 4	" "
Dekalb, Corunna	Monday, Nov. 29	E. H. Collins, J. L. Shawver.
R. M. Lockhart, Waterloo	Tuesday, Nov. 30	" "
Noble, Albion	Wednesday, Dec. 1	" "
Rev. W. Talbert, Albion	Thursday, Dec. 2	" "
Whitley, Columbia City	Friday, Dec. 3	" "
Albert Bush, Coesse	Saturday, Dec. 4	" "

FARMERS' INSTITUTES—Continued.

Place of Meeting and Chairman of Institute.	Date.	Assigned Speakers.
Crawford, Grantsburg	Monday, Nov. 29	M. Trusler, H. L. Nowlin.
C. T. Myler, West Fork	Tuesday, Nov. 30	“ “
Clark, Otisco	Wednesday, Dec. 1	“ “
Jos. Haymaker, Charlestown	Thursday, Dec. 2	“ “
Scott, Lexington	Friday, Dec. 3	“ “
J. W. Hart, Lexington	Saturday, Dec. 4	“ “
Miami, Peru	Monday, Nov. 29	T. B. Terry, Prof. J. Troop.
H. W. Pearson, Peru	Tuesday, Nov. 30	“ “
Grant, Marion	Wednesday, Dec. 1	O. F. Lane, T. B. Terry.
John Cox, Fairmount	Thursday, Dec. 2	“ “
Wabash, Wabash	Friday, Dec. 3	“ “
H.S.Finkenbiner,N.M'nch'st'r	Saturday, Dec. 4	“ “
Jefferson, Stony Point	Monday, 6th	S. H. Todd, H. E. VanDeman.
John Chapman, Lancaster	Tuesday, 7th	“ “
Switzerland, Vevay	Wednesday, 8th	“ Prof. C. S. Plumb.
Mrs. S. O. N. Pleasants, Vevay	Thursday, 9th	“ “
Ohio, Mt. Carmel Church	Friday, 10th	“ “
Edward Winn, Rising Sun	Saturday, 11th	“ “
Owen, Spencer	Monday, 6th	Cal. Husselman, T. E. Bowles.
T. A. Peden, Spencer	Tuesday, 7th	“ “
Greene, Worthington	Wednesday, 8th	“ “
F. McDermont, Worthington	Thursday, 9th	“ “
Clay, Center Point	Friday, 10th	“ “
George Stearley, Stearleyville.	Saturday, 11th	“ “
Jennings, North Vernon	Monday, 6th	Jas. Riley, Prof. H. A. Huston.
K. F. Clapp, Scipio	Tuesday, 7th	“ “
Ripley, Osgood	Wednesday, 8th	“ “
Nicholas Smith, Holton	Thursday, 9th	“ “
Dearborn, Pleasant View Grange	Friday, 10th	“ “
H. D. Tufts, Aurora	Saturday, 11th	“ “
Sullivan, Sullivan	Monday, 6th	H. F. McMahan, Mrs. J. C. Erwin.
George Goodwin, Sullivan	Tuesday, 7th	“ “
Martin, Shoals	Wednesday, 8th	“ “
J. M. Sherfick, Shoals	Thursday, 9th	“ “
Dubois, Huntingburg	Friday, 10th	“ “
S. H. Stewart, Ireland	Saturday, 11th	“ “
Warren, West Lebanon	Monday, 6th	T. B. Terry, Prof. C. S. Plumb, Prof. W. C. Latta.
F. Goodwine, Williamsport	Tuesday, 7th	
Vigo, Terre Haute	Wednesday, 8th	T. B. Terry, Prof. A. W. Bitting.
W. W. Pugh, Terre Haute	Thursday, 9th	“ “
Parke, Rockville	Friday, 10th	“ “
John Goss, Bellmore	Saturday, 11th	“ “
Benton, Boswell	Monday, 6th	G. G. Jenkins, J. L. Shawver.
Dr. J. M. Rodman, Fowler	Tuesday, 7th	“ “
Fountain, Veedersburg	Wednesday, 8th	“ “
C. W. McKinney, Newton	Thursday, 9th	“ “
White, Chalmers	Friday, 10th	“ “
Albert Goslee, Chalmers	Saturday, 11th	“ “
Vermillion, Dana	Monday, 13th	D. B. Johnson, C. M. Hobbs.
Mrs. B. F. Staats, Dana	Tuesday, 14th	“ “
Montgomery, Crawfordsville	Wednesday, 15th	“ “
J. M. Harshbarger, Ladoga	Thursday, 16th	“ “
Carroll, Flora	Friday, 17th	“ “
S. T. Sterling, Camden	Saturday, 18th	“ “
Shelby, Shelbyville	Monday, 13th	T. E. Bowles, Mrs. W. W. Stevens.
Isom Wray, Shelbyville	Tuesday, 14th	“ “
Bartholomew, Hope	Wednesday, 15th	T. B. Terry, Mrs. W. W. Stevens.
Samuel Hitchcock, Hope	Thursday, 16th	“ “
Decatur, Adams	Friday, 17th	“ “
C. I. Ainsworth, Greensburg	Saturday, 18th	“ “
Union, Liberty	Monday, 13th	T. B. Terry, A. O. Lockridge.
E. A. Kitchel, Liberty	Tuesday, 14th	“ “
Wayne, Centerville	Wednesday, 15th	Miss J. Rhodes, A. O. Lockridge.
J. A. Commons	Thursday, 16th	“ “
Franklin, Brookville	Friday, 17th	A. O. Lockridge, A. Jones.
Perry Schultz, Oxford, O.	Saturday, 18th	“ “
Hendricks, Danville	Monday, 13th	Prof. A. W. Bitting, J. A. McFarlin.
J. M. Barlow, Plainfield	Tuesday, 14th	“ “

FARMERS' INSTITUTES—Continued.

PLACE OF MEETING AND CHAIRMAN OF INSTITUTE.	DATE.	ASSIGNED SPEAKERS.
Hamilton, Cicero	Wednesday, 15th	Prof. H. A. Huston, J. A. McFar-
T. J. Lindley, Westfield	Thursday, 16th	" " [lin.
Delaware, Muncie	Friday, 17th	J. A. McFarlin, Prof. C. S. Plumb.
J. M. Bloss, Muncie	Saturday, 18th	" "
Jay, Portland	Monday, 20th	H. F. McMahan, T. B. Terry.
Albert Brunson, Poling	Tuesday, 2 st	" "
Rush, Milroy	Wednesday, 22d	" "
James Archey, Milroy	Thursday, 23d	" "
Jackson, Seymour	Thursday, 23d	" "
D. M. Lett, Crothersville	Friday, 24th	" "

JANUARY.

Adams, Decatur	Monday, 10th	A. O. Lockridge, Prof. H. A.
E. S. Moses, Decater	Tuesday, 11th	" " [Huston.
Allen, Ft. Wayne	Wednesday, 12th	" "
Alex. Johnson, Ft. Wayne	Thursday, 13th	" "
Steuben, Angola	Friday, 14th	" "
F. B. Van Auken, Pl's'nt Lake	Saturday, 15th	" "
Knox, Bicknell	Monday, 10th	J. J. W. Billingsley, H. F. Mc-
Ellis House, Bicknell	Tuesday, 11th	" " [Mahan.
Gibson, Owensville	Wednesday, 12th	" "
J. W. Johnson, Princeton	Thursday, 13th	" "
Posey, Poseyville	Friday, 14th	" "
T. A. Fletchall, Poseyville	Saturday, 15th	" "
Starke, Knox	Monday, 10th	O. F. Lane, Cal. Husselman.
S. C. Shilling, Knox	Tuesday, 11th	" "
Pulaski, Star City	Wednesday, 12th	" "
Thos. Carey, Star City	Thursday, 13th	" "
Jasper, Rensselaer	Friday, 14th	" "
L. Strong, Rensselaer	Saturday, 15th	" "
Henry, Newcastle	Monday, 17th	A. O. Lockridge, Jas. Riley.
E. H. Peed, Newcastle	Tuesday, 18th	" "
Hancock, Greenfield	Wednesday, 19th	" "
D. H. Goble, Greenfield	Thursday, 20th	" "
Randolph, Winchester	Friday, 21st	A. O. Lockridge, Miss J. Rhodes.
W. T. Farquhar, Trenton	Saturday, 22d	" "
Howard, Kokomo	Monday, 17th	A. Jones, Cal. Husselman.
O. A. Somers, Kokomo	Tuesday, 18th	" "
Wells, Bluffton	Wednesday, 19th	" "
I. V. L. Garrett, Liberty Center	Thursday, 20th	" "
Blackford, Hartford City	Friday, 21st	A. Jones, Jas. Riley.
J. C. Moore, Hartford City	Saturday, 22d	" "
St. Joseph, South Bend	Monday, 17th	S. H. Todd, Prof. H. A. Huston.
Aaron Jones, South Bend	Tuesday, 18th	" "
Lagrange, Lagrange	Wednesday, 19th	S. H. Todd, Prof. C. S. Plumb.
J. W. Mills, Lagrange	Thursday, 20th	" "
Kosciusko, Warsaw	Friday, 21st	S. H. Todd, M. Trusler.
Joel Hall, Clunette	Saturday, 22d	" "
Marshall, Plymouth	Monday, 17th	C. M. Hobbs, H. F. McMahan.
H. L. Jarrell, Tyn r City	Tuesday, 18th	" "
Porter, Valparaiso	Wednesday, 19th	" "
E. S. Merrifield, Boone Grove	Thursday, 20th	" "
Laporte, Laporte	Friday, 21st	" "
W. A. Banks, Laporte	Saturday, 22d	" "
Newton, Kentland	Monday, 24th	Cal. Husselman, Mrs. J. C. Erwin.
Charles Roe, Kentland	Tuesday, 25th	" "
Lake, Crown Point	Wednesday, 26th	" "
C. B. Benjamin, Leroy	Thursday, 27th	" "
Fulton, Rochester	Friday, 28th	" "
C. W. Montgomery, Rochester	Saturday, 29th	" "
Tippecanoe, Lafayette	Wednesday, 26th	G. G. Jenkins, S. H. Todd.
C. J. Whistler, Heath	Thursday, 27th	" "
Putnam, Greencastle	Friday, 28th	H. F. McMahan, Prof. A. W.
A. O. Lockridge, Greencastle	Saturday, 29th	H. F. McMahan. [Bitting.

FARMERS' INSTITUTES—Continued.

FEBRUARY.

PLACE OF MEETING AND CHAIRMAN OF INSTITUTE.	DATE.	ASSIGNED SPEAKERS.
Tipton, Tipton	Monday, Jan. 31	S. H. Todd, C. M. Hobbs.
W. S. Kelley, Tipton	Tuesday, Feb. 1	" "
Clinton, Frankfort	Wednesday, Feb. 2	" "
D. F. Clark, Mulberry	Thursday, Feb. 3	" "
Cass, Logansport	Friday, Feb. 4	" "
Colt Barnett, Logansport	Saturday, Feb. 5	" "
Fayette, Connersville	Monday, Jan. 31	H. F. McMahan, Cal. Husselman.
M. Trusler, Connersville	Tuesday, Feb. 1	" "
Johnson, Franklin	Wednesday, Feb. 2	" "
C. C. Van Nuys, Franklin	Thursday, Feb. 3	" "
Morgan, Mooresville	Friday, Feb. 4	" "
D. B. Johnson, Mooresville	Saturday, Feb. 5	" "
Madison, Anderson	Monday, 7th	A. O. Lockridge, Mrs. W. W.
I. B. Jones, Pendleton	Tuesday, 8th	" " [Stevens.
Marion, Valley Mills	Wednesday, 9th	" "
C. C. Richards, Howlands	Thursday, 10th	" "
Boone, Lebanon	Friday, 11th	" "
J. C. Jaques, Thorntown	Saturday, 12th	" "
Elkhart, Goshen	Tuesday, 15th	Mrs. W. W. Stevens, Cal. Hussel-
John Scranage, Goshen	Wednesday, 16th	" " [man.
Huntington, Huntington J. M. Keefer, Roanoke	Thursday, 17th Friday, 18th Saturday, 19th	Cal. Husselman, Mrs. W. W. Stevens, Prof. W. C. Latta.

ADDITIONAL INSTITUTES HELD UNDER STATE AUSPICES.

COUNTY AND PLACE OF MEETING.	DATE.	SPEAKERS ASSIGNED.
Carroll, Delphi	March 25-26	Cal. Husselman. Prof. W. C. Latta.
Clark, Henryville	March 4-5	James Riley. Mrs. F. Ross.
Dearborn, Bright	March 9-10	W. W. Stevens.
Delaware, Muncie	March 29-30	Prof. W. C. Latta.
Hamilton, Arcadia	February 18-19	
Howard, Kokomo	March 18-19	
Jefferson, Saluda	March 17-18	Prof. H. A. Huston. M. Trusler.
Jennings, Butlerville	March 18-19	
Lake, Lowell	February 19	Prof. C. S. Plumb.
Lake, Hobart	February 26	Mrs. J. C. Erwin.
Noble, Ligonier	January 27-28	
Perry		
Pulaski, Pulaski	March 23-24	Cal. Husselman. Prof. W. C. Latta.
Randolph, Lynn	March 26	Prof. W. C. Latta.
Scott, Blocher	February 9-10	H. F. McMahan.
Sullivan, Carlisle	March 4-5	Prof. W. C. Latta.

In addition to the Institutes held under State auspices, as shown in the schedule above, several of the counties are holding one or more independent one-day Institutes. These one-day meetings are held in the smaller towns and country churches or school houses. Quite a number of mid-summer meetings, known as picnic Institutes, are held in conveniently located groves. The programs of these independent Institutes are much like those of the annual meetings, although less extensive. As a rule only local workers are employed and a basket dinner is a well-nigh universal and very pleasant feature of these meetings. It is impossible to give the number of independent meetings which have been held, as reports of said meetings have not been required. It is believed, however, that 125 or more State and independent meetings have been held independently for each of the last three or four years. The following is a list of the counties as far as heard from holding independent meetings during the current year, with the number in each case:

INDEPENDENT INSTITUTES.

COUNTY.	No. HELD.	COUNTY.	No. HELD.
Adams	1	Marshall	1
Allen	6	Monroe	1
Benton	1	Pike	1
Boone	4	Porter	5
Clinton	2	Putnam	1
Daviess	4	Randolph	1
Dekalb and Steuben	1	Ripley	1
Fountain	6	Steuben	1
Franklin	1	Sullivan	1
Fulton	5	Tippecanoe	7
Grant	1	Union	1
Greene	1	Washington	1
Harrison	1		
Huntington	5	Total	62

In the table which follows, the average attendance at the several sessions of each Institute is shown. In making up this table for the last two years the reports of the secretaries and assigned speakers have been consulted. These officers were requested to ascertain by actual count the number present at each session. In some cases, however, estimates were made, as it was difficult to secure an actual count. In all cases where the reports differed their average has been taken. Previous to the last two years the attendance has been made up from the reports of the secretaries only. The table shows a considerable falling off in the attendance of 1896-97 and no increase in 1897-98. This showing is doubtless due to the fact that the assigned speakers (whose reports for the last two years have been consulted, as stated above) frequently report a smaller attendance than the secretaries. It is the opinion of the

Superintendent, therefore, that the attendance for 1895-96 was slightly exaggerated and that the attendance during the current year has been greater than in any previous year.

TABLE SHOWING ATTENDANCE AT FARMERS' INSTITUTES.

County.	Number Sessions Held.	Average Attendance.
Adams	5	152
Allen	5	207
Bartholomew	5	560
Benton	5	210
Blackford	5	134
Boone	....	255
Brown	4	46
Carroll	9	135
Cass	4	220
Clark	10	113
Clay	5	156
Clinton	8	335
Crawford	5	53
Daviess	4	86
Dearborn	10	162
Decatur	5	319
Dekalb	6	248
Delaware	9	56
Dubois	5	236
Elkhart	5	489
Fayette	5	202
Floyd	5	87
Fountain	5	170
Franklin	5	257
Fulton	5	597
Gibson	5	274
Grant	5	370
Greene	5	190
Hamilton	10	515
Hancock	5	280
Harrison	5	288
Hendricks	4	178
Henry	5	590
Howard	9	434
Huntington	8	350
Jackson	5	135
Jasper	6	261
Jay	8	275
Jefferson	10	177
Jennings	9	138
Johnson	5	232
Knox	6	284
Kosciusko	5	799
Lagrange	5	754
Lake	9	170
Laporte	6	320
Lawrence	5	70
Madison	5	580
Marion	5	165
Marshall	5	685
Martin	5	174
Miami	4	118
Monroe	5	204
Montgomery	5	331
Morgan	5	399
Newton	5	255
Noble	9	247
Ohio	5	146
Orange	5	292
Owen	4	77
Parke	4	437
Perry	11	168
Pike	5	217
Porter	5	91
Posey	5	400
Pulaski	10	140
Putnam	5	250
Randolph	7	537
Ripley	5	163
Rush	5	128
Scott	10	93
Shelby	5	480
Spencer	5	215
Starke	5	120
St. Joseph	5	1,440
Steuben	8	431
Sullivan	10	133
Switzerland	5	340
Tippecanoe	5	198
Tipton	5	482
Union	6	323
Vanderburgh	6	177
Vermillion	5	118
Vigo	5	217
Wabash	5	260
Warren	5	163
Warrick	4	138
Washington	5	107
Wayne	5	384
Wells	5	280
White	4	81
Whitley	5	252
General average	....	272
General average, 1894-95	....	118
General average, 1895-96	....	272
General average, 1896-97	....	232

EXPENDITURES.

The following is a classified statement of disbursements of the Institute fund for the year ending October 31, 1898, as taken from the books of the Superintendent of Institutes:

Bills of Chairmen	$2,034 31
Traveling expenses of assigned speakers	1,163 71
Per diem of assigned speakers	1,229 48
Traveling expenses of Superintendent	26 30
Stenographic and other clerical work	297 28
Printing and stationery	101 23
Postage	110 00
Supplies	15 40
Telegrams, freight and express	7 69
Miscellaneous	14 60
Total	$5,000 00

EXTRACTS FROM REPORTS OF INSTITUTES.

The extracts given below are from the reports of the secretaries and assigned speakers. The primary object of these reports is to assist the Superintendent in planning the work from year to year. It is believed, however, that the publication of extracts from these reports will prove suggestive and helpful alike to local officers and speakers. It is believed, also, that these reports have all been made with a view of promoting the interests of the Institute work, and it is hoped that whatever criticisms are found will be received in the same kind spirit in which they were made. Chairmen and secretaries in particular will do well to read the comments on all the meetings held.

OFFICIAL COMMENTS ON THE INSTITUTE WORK.

Adams: Interest good. South part of county not well represented. Weather and roads very bad.—Secretary.

The city press not active in advertising or taking notes of the Institute. Not many home workers. Interest very fine.—Assigned Speaker.

Allen: Interest much increased over last year. The township Institutes and sugar beet "booming" have materially helped. We are very much encouraged and intend to keep at it.—Chairman.

It was the best advertised Institute I ever attended. Plenty of home workers.—Assigned Speaker.

Bartholomew: Weather favorable and the farmers came from all over the county in great numbers. It was the banner Institute of Bartholomew County.—Secretary.

Nothing seemd to have been left undone that would add to the interest or attendance. A little poultry and grain show was a nice feature of the Institute. I never attended a more enthusiastic meeting. Every one did all in his power to make this a banner Institute.—Assigned Speaker.

Benton: The Institue was a great success in every particular. The talks were excellent and instructive, the music fine and everybody well pleased.—Secretary.

I find a growing interest in these meetings. Formerly the interest was confined to a small circle, but now it is spreading throughout the county. There were men at some of the sessions who came fifteen miles or more.—Assigned Speaker.

Blackford: The attendance was larger than usual, although the weather was rather unfavorable. Interest and enthusiasm on the increase. We were well pleased with the work of the assigned speakers. Home talent slow to respond.—Secretary.

Seemed to have been poorly advertised. Home interest not what it should be.—Assigned Speaker.

Boone: Weather and roads extremely bad, preventing many of our farmers from attending, yet we had a fair attendance and an excellent program. The assigned speakers (Mrs. Stevens and Mr. Lockridge) were much appreciated.—Secretary.

Brown: The Institute was good except in point of attendance. We had only one home worker on the list that would speak. However, quite a number of farmers joined in the discussions. The assigned speakers were both present and were good instructors.—Secretary.

The degree of interest at first was very low, but it increased in a marked and substantial manner until the close. The Institute was well advertised. Home workers not strongly urged.—Assigned Speaker.

Carroll: The interest was fair, part of the time excellent. Several good papers by home talent. Assigned speakers gave satisfaction.—Secretary.

Attendance not what it should have been, but the interest was good. We could see the good effects of a Farmers' Club in this county. Several members of the Club were present and were the life of the meeting. Everything seemed to be in harmony. Hall not well cared for.—Assigned Speaker.

Cass: Very satisfactory degree of interest manifested. Assigned speakers gave excellent satisfaction.—Secretary.

Attendance not what it should have been. Few ladies and young people present.—Assigned Speaker.

Clark: This has been one of the best and most interesting Institutes ever held in Clark County. The conditions were unfavorable.—Secretary.

Interest very good. Every person seemed to want to work for success and most of them went at it intelligently. Institute well advertised. Home workers all present and prepared.—Assigned Speaker.

Clay: Weather and roads very bad. Mr. Bowles gave us, as usual, many good things to think about. Mr. Husselman is most assuredly what his name implies—a hustler. He gave us so many good points that we were lost in amazement at our ignorance.—Secretary.

There is not much improvement in the Institute in the last seven years. Advertising not well done.—Assigned Speaker.

Clinton: Weather very cold and disagreeable. Interest the best we have ever had. Will have to have a larger hall next year. We find that holding township Institutes is a great help in increasing the attendance. Messrs. Todd and Hobbs as assigned speakers were eminently satisfactory. If we could have such men every year it would be worth thousands of dollars to our county.—Secretary.

Well advertised. Newspapers well represented and gave unusually fine accounts of the meetings each session. Weather against attendance. Home work good. Am satisfied it would have been the largest and best Institute ever held in the county if the weather had been good.—Assigned Speaker.

Crawford: A good deal of enthusiasm manifested. Conditions favorable. The work of the State instructors was greatly appreciated by all.—Secretary.

Advertising well done, but not early enough. No reporters present and none seemed to have been invited. The few home workers who took part did very well. The meetings would have been more of a success if the ladies had attended in larger numbers.—Assigned Speakers.

Daviess: The Institute was the very best in point of interest and attendance ever held in the county. Mr. Lockridge's talks were well received. All of Mrs. Erwin's papers were the very best and received with great favor.—Secretary.

Was informed that the Institute had not been well advertised. Home workers were not sufficiently urged though several did good work in the general discussions. The degree of interest manifested was good and there were plainly signs of an increasing desire to know more about the work. If the people of the county could be brought out to one session success afterward would be sure.—Assigned Speaker.

Dearborn: Interest good at the several sessions. Discussion not so spirited as it should have been, but this was on account of an overloaded program. Bad weather kept many from a distance at home.—Secretary.

Well advertised. Home workers present in force and did good work.—Assigned Speaker.

Decatur: The best Institute in point of attendance and interest ever held in the county, although the weather was miserable. Mr. Terry's lectures were listened to with rapt attention. Mrs. Stevens' papers were received with much interest and were ably prepared and faultlessly delivered.—Secretary.

Nothing left undone. I saw no weak points whatever. Every committee did its duty. All on the program responded with well prepared papers. Interest good.—Assigned Speaker.

Dekalb: The roads were badly frozen and rough, but the attendance increased at each session until the house was overflowing. Every one seemed pleased and happy and are getting ready for the Institute of 1898. Messrs. Collins and Shawyer gave excellent satisfaction.—Secretary.

A good series of meetings and a creditable Institute. All officers did well.—Assigned Speaker.

Delaware: The weather could not have been worse. Roads were so slick that a smoothshod horse could not get out. It was impossible for the farmers to get to town, consequently the attendance was very small, but the interest taken was good. Prof. Plumb's addresses were splendid and every one was pleased with them.—Secretary.

The program was made for a show for city schools and singers rather than for a Farmers' Institute.—Assigned Speaker.

Dubois: Interest very good. Success the best ever attained. Conditions unfavorable, owing to bad weather and roads. Mr. McMahan was very good. Mrs. Erwin's papers were excellent.—Secretary.

Interest excellent and there seemed to be a real desire to learn better farming methods.—Assigned Speaker.

Elkhart: First day bad weather kept many away. The second day both roads and weather were better and the attendance steadily increased. Interest was good from start to finish, and those who were called on for discussions responded in brief, pointed remarks. It may be called an ideal Institute in nearly every respect. The addresses of Mrs. Stevens and Mr. Husselman were pointed and practical and well received.—Secretary.

Fayette: Perhaps this was the best Institute ever held in the county. The weather was unfavorable, yet we had a fair attendance. The Farmers' Institute is growing in favor with all classes as they become better acquainted with its workers. Mr. Husselman is the right man in the right place. Mr. McMahan gave the Institute several good talks, and is perhaps one of the best workers in the State, especially among the young people.—Secretary.

Advertising was well done. All home workers responded. Night session not well attended; the probable cause cold weather.—Assigned Speaker.

Floyd: The interest manifested was as great as at any meeting of the past. Conditions for holding the Institute were favorable. The assigned speakers considered extra good.—Secretary.

Fountain: Never before was such a degree of interest manifested. There was enthusiasm from opening to close. Messrs. Shawver and Jenkins were highly appreciated. Nearly all home workers were prepared and commanded good attention.—Secretary.

Not sufficiently advertised, though the attendance was fair.—Assigned Speaker.

Franklin: Rained hard all first day. On second day the attendance was good. Much interest taken. Farmers very prompt in asking questions for information. Audience well pleased with Mr. Lockridge and Mr. Jones.—Secretary.

There is good material in Franklin county. Home workers good and their points well taken. All seemed to be determined to make the Institute a complete success.—Assigned Speaker.

Fulton: Interest intense from the first. Every subject brought out comments and discussion. The question that confronts us now is, "Where shall we find a room large enough to accommodate the crowds?" An Institute was organized in every township but two, and they will organize before the year closes. Our assigned speakers were the right persons in the right place.—Secretary.

There seemed to be harmony all around.—Assigned Speaker.

Gibson: The Institute was one of great interest and of much benefit to the farmers. Though the roads were very muddy the hall was crowded all the time and the farmers were very sorry when the meeting closed.—Secretary.

Institute well advertised. There seemed to be a studied effort on the part of a few to ignore outside speakers. Quite an interest was manifested and the Institute was a success.—Assigned Speaker.

Grant: The best Institute ever held in the county, both in interest and success. There are no weak points in Mr. Terry's talks. Mr. Lane gave very good satisfaction.—Secretary

The discussions were interesting throughout. Interest at no time lagged. The genius displayed in selecting the subjects was very commendable. It would be better to have more home workers on program. The last day's sessions were unusually enthusiastic.—Secretary.

Greene: We are pleased to note a growing interest in the Institute work in this county. We believe the conviction is taking root in the minds of Indiana farmers that these Institutes are solely for the purpose of elevating the profession of farming. Assigned speakers both did work that will be productive of much good to the farmers.—Secretary.

Good officers, but poor advertising.—Assigned Speaker.

Hamilton: More than 300 people were present at the first session, although the weather was very bad. In the afternoon the audience increased to 500 or over and all were much interested. At the evening ssesion the hall was packed. All agree that the Institute was a great success.—Secretary.

Institute from start to finish was alive and took each subject up and discussed it rapidly and intelligently. As far as I could learn the preparations were good.—Assigned Speaker.

Hancock: The Institute opened with fine prospects, and if we had had room we would have had an attendance of 800 to 1,000 the first day. The second day was rainy, but we had about all our courthouse would hold. We had a wonderfully successful Institute.—Secretary.

Institue well advertised. Not enough home workers.—Assigned Speaker.

Harrison: The most successful Institute ever held in the county. With such instructors as Van Deman and Husselman our Institutes will grow in interest and usefulness.—Secretary.

Hendricks: Interest was excellent. There seemed to be none present out of idle curiosity. Had the weather been better the attendance would have been doubled. Mr. McFarlin's talks were well received and practical. Dr. Bitting's talks were also well received and attracted the closest attention.—Secretary.

The interest of the townspeople seemed to be small, owing, perhaps, to the fact that a horse show was held on the days of the Institute.—Assigned Speaker.

Henry: The most interesting and successful Institute ever held in this county. It was a job to take care of the people. The committee had everything ready and in order. James Riley is a success as an Institute worker. Many good things were learned from Mr. Lockridge.—Secretary.

Well advertised. Home workers prompt and effective. Degree of interest very high, indeed. Attendance quite large.—Assigned Speaker.

Howard: Best Institute we ever held and greatest attendance.—Secretary.

General interest good. But little effort made by home talent.—Assigned Speaker.

Huntington: An increase of 25 per cent. over last year. Our people are aroused to the importance of the Institute work. Had the roads and weather been good no hall in Huntington would have held more than one-half the crowd the closing day. Men living near the railroads walked from two to six miles morning and evening to attend the meeting. If Prof. Latta, Cal Husselman and Mrs. Stevens have any weak points they did not bring them to the Institute. Interest increased each day.—Secretary.

Jackson: Everybody seemed pleased with the Institute. Assigned speakers have good talks.—Secretary.

Jasper: The Institute in general was a success. Attendance was large and nearly all seemd to be interested. Assigned speakers gave entire satisfaction.—Secretary.

The Institute seemed to have been very well worked up. A large amount of intelligence and interest were manifested.—Assigned Speaker.

Jay: Institute a decided success, considering the bad weather and roads. Subjects well presented and discussed. Local interest intense and attendance remarkably good.—Secretary.

Jefferson: Best Institute ever held in the county. All leading farmers were present, some from distant localities. Attendance good throughout the meeting.—Secretary.

Jennings: Institute not as largely attended as it should have been, considering the rather favorable weather. Mr. Riley is an excellent worker. Mr. H. F. Work is a successful talker. Prof. Huston very acceptable.—Secretary.

This Institute was in my judgment a failure in attendance. Interest became worked up very good the last day. Very poorly advertised. Press reporters not invited.—Assigned Speaker.

Johnson: Interest good. Best Institute yet held in the county. Reached more people of the county than ever before. Good attendance, notwithstanding the extreme cold weather. Mr. McMahan splendid. Mr. Husselman excellent.—Secretary.

I think the Institute was not well advertised. Interest very good. No drag at any time.—Assigned Speaker.

Knox: Best Institute ever held in the county. Weather favorable. The new M. E. church was offered for the next Institute. Assigned Speakers gave good satisfaction.—Secretary.

No home workers on program. Degree of interest very much better than the average. The cause of this seemed to be the determination of all to make it a success. —Assigned Speaker.

Kosciusko: Institute was held under unfavorable circumstances as to weather and roads. Interest excellent and a success in all particulars.—Secretary.

Lagrange: Interest great. Success grand. Attendance fully one-half women. All enthusiastic and ready for discussion at all times, and all say this was the best Institute ever held in the county.—Secretary.

Lake: Condition of roads and weather fine. Interest increasing, as can be seen from the attendance. Mr. Husselman and Mrs. Erwin both did noble work.—Secretary.

Marked increase in interest. The success is probably due to the intelligent farming people there. Meeting well advertised. Nothing seemed to have been neglected.—Assigned Speaker.

Laporte: Second day of Institute was very stormy, which kept many away. Messrs. Hobbs, McMahan and Dr. Stone had no weak points. Their papers and talks were instructive and gave much information of value.—Secretary.

Interest excellent. I believe this was due to experience meetings held before each session. Institute had been advertised in county papers and talked up by township vice-presidents. The attendance was not as large as it should have been. Interest was good.—Assigned Speaker.

Lawrence: Although the attendance was not large, all present were in earnest and are persons who may be seen at every Institute.—Secretary.

Institute was well advertised in local papers. Program was too crowded and considerable was left out. The attendance was not one-fourth what it should have been, but the interest was very good.—Assigned Speaker.

Madison: The interest seemed to be more than ordinary and the weather was excellent. We did not have room enough to accommodate the people who wanted to hear. Assigned speakers gave good satisfaction.—Secretary.

Marion: Program committee were late in advertising the meeting and this prevented a larger attendance. It was, however, a live meeting and will give much enthusiasm to the work in the vicinity of Valley Mills. Mr. Lockridge and Mrs. Stevens are O. K.—Secretary.

Plenty of home workers, and all good. The interest in the meeting was of a high order.—Assigned Speaker.

Marshall: We had a very interesting Institute, the farmers taking an active part in the discussions. Questions came thick and fast and the speakers were kept on the alert all the time.—Secretary.

Except at the first session the seats were all occupied and the interest was marked at all sessions. There was an unusual number of ladies and young men present at all sessions. Not as well advertised as usual. They say they have no building large enough to hold the crowds when the meetings are well advertised.—Assigned Speaker.

Martin: Assigned speakers gave entire satisfaction. The discussion by home talent was lively and some good information was received by the Institute.—Secretary.

Interest excellent. I think the bad roads kept many away. I believe home workers had not been notified.—Assigned Speaker.

Miami: The unfavorable weather kept many away that would otherwise have been out. The interest taken was good. The work of Prof. Troop and Mr. Terry was all that could be desired.—Secretary.

Monroe: Although the weather was rainy we had the best Institute ever held in the county. The farmers seemed to take more interest than ever before, and the attendance was the largest we ever had. Both assigned speakers were very good.—Secretary.

Much interest taken and the subjects on program were discussed quite fully. Very well advertised.—Assigned Speaker.

Montgomery: The interest in Institute work is growing each year, noted especially by the large attendance at each session and the enthusiasm manifested in the discussions, and if the interest continues to increase we will have to get a larger room than the "big court room" to hold the people.—Secretary.

Interest very good most of the time, but there were not enough active farmers present. Program was carried out in full. The best class of citizens generally were present.—Assigned Speaker.

Morgan: We had a rousing Institute—the best one yet held—from beginning to end. The enthusiasm ran very high. Attendance very good. Messrs. Husselman and McMahan did splendid work.—Secretary.

Interest fair. Too much of a disposition to accept speaker's statements without question. Not enough on program. Success of Institute due to thorough advertising. Mr. Johnson an excellent presiding officer.—Assigned Speaker.

Newton: The first three sessions were well attended, as the weather was favorable. The second day was rainy and the attendance not so good. A good degree of interest noticeable throughout every session. The farmers of Newton county are being interested in these Institutes and want another before winter is over.—Secretary.

The weather was bad, the roads almost impassable, but the attendance was estimated as being greater than ever before. Several good home papers were read.—Assigned Speaker.

Noble: The Institute was good and an entire success throughout. The conditions for holding the meeting were most favorable. Messrs. Shawver and Collins gave good satisfaction, as their talks were practical and pointed.—Secretary.

The Institute grew in interest and was a season of practical work.—Assigned Speaker.

Ohio: The interest manifested was good throughout the Institute. Many farmers were attending court, and on Friday a funeral kept many away. On the whole we consider the Institute quite a success. Prof. Plumb and Mr. Todd gave universal satisfaction.—Secretary.

Orange: There was a marked interest manifested, and the Institute was a success. The farmers have taken hold of the work and are appreciating the advantages vouchsafed by the law authorizing Institutes. Mr. Todd and Mr. Burris were pleasant and instructive speakers.—Secretary.

Institute was not properly advertised in advance.—Assigned Speaker.

Owen: First day not pleasant as to weather. Second day the weather and attendance were good. The interest was good. Secretary.

No press reporters present. Program full of fence agents, who occupied the time in advertising their fences.—Assigned Speaker.

Parke: There was more interest manifested than usual. The attendance was better, although the weather was not favorable. Mr. Terry did excellent work. Dr. Bitting also did fine work.—Secretary.

Perry: Our Institute was well attended considering the remoteness from railroad or river. The deepest interest prevailed throughout. The

Institute voted to ask for the return of Messrs. McMahan and Riley.—Secretary.

The Institute was an excellent one. Several schools were dismissed for the two days.—Assigned Speaker.

Pike: All the work of the assigned speakers was well done and created quite an interest, as will be seen by the attendance.—Secretary.

The interest ran very high, which was one cause of the flattering success of the meeting. I will venture that there will not be a more enthusiastic meeting in Indiana this winter than this one. Church proved too small for the people.—Assigned Speaker.

Porter: The present Institute has been decidedly the most interesting ever held in the county, and has left all of our people who attended delighted with the results.—Secretary.

Probably not very well advertised. Attendance not what it should have been; made up largely of old men. Interest excellent.—Assigned Speaker.

Posey: The interest was the best ever manifested before in the work. and the Institute was pronounced the best yet held in the county. There was a large attendance at each session notwithstanding the constant downpour of rain. Both Billingsley and McMahan did excellent work. Everybody was well pleased with them.—Secretary.

Institute had been well advertised. Great interest. Success due to the efforts of chairman and an intelligent community. The house was crowded, although it rained nearly all the time, and the roads were almost impassable.—Assigned Speaker.

Pulaski: The interest shown at the Institute was much better than I expected, and the attendance would have been larger but the weather was unfavorable and the roads very bad. The people speak in the highest terms of Messrs. Husselman and Lane, the assigned speakers.—Secretary.

The Institute was slow to open, but the interest grew from the first session, and the last three sessions were simply intense in interest. A delegation came to hotel and escorted the assigned speakers to the train at night, bidding them godspeed in the good work, and giving many expressions of approval.—Assigned Speaker.

Putnam: The interest of the people attending the Institute was very marked. The success of the meeting was assured from the first, and the close marked the ending of one of the most successful Institutes ever held in the county.—Secretary.

For some reason the young men did not take part in the discussions. —Assigned Speaker.

Randolph: The weather was very bad, but the attendance was the largest and the interest the best of any Institute ever held in the county. —Secretary.

The Institute was one of the very best. All were interested, town as well as country, and all attended. The progressive spirit of Randolph

County contributed in a large measure to the success of the Institute. I have never heard better home workers.—Assigned Speaker.

Ripley: The Institute was considered the best ever held in Ripley County. Interest greater, attendance much larger, and more ladies attended than ever before. Prof. Huston's lectures were well worth attending the Institute to hear. Mr. Riley was exceedingly well liked.—Secretary.

Preparations good; advertising extra good. Home workers were also good. Thorough advertising was the probable cause of the success of the meeting.—Assigned Speaker.

Rush: The Institute was held too near the holidays. The attendance was not what it should have been, but the weather was unpleasant. Those who attended took good interest in the discussions and in the Institute generally.—Secretary.

Scott: Interest good; the weather conditions very unfavorable.—Secretary.

Interest good throughout, and many young people present at each session. Advertising not well done. Home workers were on hand generally, but no ladies took part.—Assigned Speaker.

Shelby: It was the largest and most enthusiastic Institute ever held in the county. Our meetings get better every year. Mr. Bowles and Mrs. Stevens fully met the expectations of our people, and gave entire satisfaction.—Secretary.

Opera house cold. Fair report in local papers. The audience was not permitted to take part in the discussions. Chairman talks too much.—Assigned Speaker.

Spencer: Institute was considered the best ever held. There was no talking against time just to fill up. The work of assigned speakers was excellent.—Secretary.

Interest very good. Intelligent community. Large proportion of the audience was young men.—Assigned Speaker.

Starke: Conditions rather unfavorable. Rainy weather, circuit and commissioners' court in session, keeping many away from Institute. Those who attended the first day were back the second.—Secretary.

The Institute work in Starke county seems to have not been appreciated in the past, but the interest is growing. Were sorry to find that home workers were not as responsive as they should have been, especially the first day. Still there seemed to be an unusual desire to learn, and the closest attention was paid to what was said by the assigned speakers. Many questions were asked, and the enthusiasm grew with each session. —Assigned Speaker.

St. Joseph: The interest taken could not have been better, and the Institute was a complete success. The drawback here is that we have not hall room enough to accommodate all who desire to attend. We were pleased with both assigned speakers.—Secretary.

Steuben: I believe this year has touched high-water mark in our Institute work.—Secretary.

I never saw better interest at a farmers' Institute. Home workers out in force.—Assigned Speaker.

Sullivan: People who never have been interested in the Institute were interested this time, and the remark was made that "We are on our feet now." Mr. McMahan and Mrs. Erwin gave general satisfaction.—Secretary.

Both interest and attendance was said to be greater than ever before. Quite a number took part in the discussions. Here, as elsewhere, more farmers are learning that the institutes are of a great benefit, and this accounts for the increased interest. Few ladies were present. Too many farmers think that these meetings are only for men.—Assigned Speaker.

Switzerland: There seems to be an increase in the degree of interest each year, as the number in attendance will indicate. The discussions were entered into by a greater number of farmers than at former meetings.—Secretary.

Everything was in perfect order for the Institute. Home talent ready for duty. Program light enough and was carried out to the letter. The interest was good from beginning to close.—Assigned Speaker.

Tippecanoe: The weather was pleasant. Institute well advertised and had the active interest of the business men of Lafayette. These things all contributed to the success of the meeting. Mr. Todd proved a very strong worker. His talks were broad, instructive and interesting. Though Mr. Jenkins' delivery was not the best, yet he so well handled his subjects that his audience gave him very close attention and knew they were listening to a practical, successful business farmer.—Secretary.

Tipton: The degree of interest has never been equaled in the history of our Institute. The opera house would not hold all the people, and many were turned away. Messrs. Todd and Hobbs were well liked by our people.—Secretary.

I consider this almost an ideal Institute. There was a large attendance of ladies and young people. Everybody was interested, there being almost perfect attention and order.—Assigned Speaker.

Union: The people listened very closely, but did not take the part in the discussions that they sometimes do. Messrs. Terry and Lockridge gave entire satisfaction. Mrs. Ross pleased our people.—Secretary.

The advertising was very effectively done. Not enough home workers. The assistance rendered here was very good, and a source of benefit, but there was not enough of it. Taken as a whole, the Union County Institute scored 100 in degree of interest. This was due to the enterprising, intelligent spirit of the farming community.—Assigned Speaker.

Vanderburgh: The attendance was very good considering the bad weather most of the time. Assigned speakers were both very good and kept the audience very attentive.—Secretary.

The interest was very gratifying, indeed. The causes of success were the industry of the chairman and his co-workers, coupled with the valuable aid of Evansville talent. The holding of township Institutes is a factor in promoting success.—Assigned Speaker.

Vermillion: The interest was great, as usual. The roads and weather made it hard for those from a distance to attend. Messrs. Hobbs and Johnson are as good workers as were ever sent us by the State. Their papers were all that could be desired and were highly appreciated.—Secretary.

I think I never saw a better set of listeners, but it was very hard to get any discussions. There seemed to be perfect harmony among the workers.—Assigned Speaker.

Vigo: The Institute was more of a success than ever before. The farmers are evidently beginning to understand its importance.—Secretary.

Wabash: First day was very cold, but those who braved the weather took a great interest and we had a lively meeting. In spite of the rain on the second day the city hall was crowded and a lively time was had.—Secretary.

I was disappointed in the home speakers, as up to the close of the fourth session, with one exception, the home talent were either absent or not prepared. While they seemed to appreciate what the assigned speakers had to say, the enthusiasm was by no means intense. In the discussions a good degree of intelligence was manifested. The north and south extremes of the county were well represented, but the citizens of Wabash seemed to take little interest in the Institute.—Assigned Speaker.

Warren: After several years' service, I am confident that the present Institute excels all others in average attendance, in the ability of the local papers and in the prospects for a more wide and general interest in coming Institutes.—Secretary.

Warrick: Weather very unfavorable, and for that reason the attendance of ladies was small. Assigned speakers did excellent work and were highly appreciated. In fact, we had the best Institute we have ever had. This is due largely to Mr. Riley and Mr. McMahan, who are splendid workers and pleasant in their manners.—Secretary.

Interest better than fair, but hardly sufficient to be called good.—Assigned Speaker.

Washington: There was good interest manifested and we think the Institute was a success considering the unfavorable condition of the weather.—Secretary.

Institute well advertised and home workers good. Meeting was full of interest from start to finish.—Assigned Speaker.

Wayne: This was one of the best Institutes ever held here, and the best farmers of the county were present. Every township in the county was represented at some time during the Institute.—Secretary.

The farmers seemed to have gathered together with the one purpose in view—that of making the Institute a success. The advertising was thorough and effective.—Assigned Speaker.

Wells: The assigned speakers were good. We could not have made a better selection had we known all the speakers in the State personally.—Secretary.

The interest seemed to be fair on the part of audience. There was absolutely no home effort.—Assigned Speaker.

White: Institute was well attended considering the unfavorable weather, and a lively interest was manifested on the part of the farmers in many of the questions brought out.—Secretary.

Preparations were well in hand in this county, but owing to the bad weather many farmers from a distance did not attend.—Assigned Speaker.

Whitley: Interest as good as might be desired. Assigned speakers gave splendid satisfaction.—Secretary.

The preparations were good and the officers prompt and efficient.—Assigned Speaker.

THE SECRET OF A SUCCESSFUL INSTITUTE.

The success of an Institute depends upon many things. Thoughtful officers and speakers who will carefully read the foregoing extracts from reports of the several Institutes held will find food for reflection, and if they will but heed the hints and suggestions contained in these reports and then earnestly seek to avoid the mistakes of the past, the work will be much improved and its success greatly increased.

The local officers in many counties have failed to publish their programs in time and duly advertise them. It sometimes comes to the attention of the Superintendent that some prominent newspaper in the county has no opportunity of publishing the program before the meeting. This may arise from pique or jealousy, but more frequently from thoughtlessness or lack of experience on the part of the local officers. It takes more effort to thoroughly advertise an Institute than most of the chairmen realize. It is not enough to simply insert an advertisement in the local papers. Some one must write newsy paragraphs about the Institute for some time previous to its occurrence. Frequently it happens that the chairman, or chairman and secretary, have the bulk of this work of advertising the Institutes to do. This is entirely wrong. The township vice-presidents and others interested should assist in advertising the meeting by word of mouth and by announcements at various meetings that may be held in the month immediately preceding the time of the meeting.

Sometimes the chairman, through good nature or lack of executive ability, allows the proceedings to drag and permits rambling and irrelevant discussion. A wide-awake chairman will be constantly on the alert to hold the discussion right to the line and head off windy speakers. The chairman should consider it his duty to be firm and prompt as well as courteous and obliging. Sometimes the interest is spoiled by permitting an assigned speaker to take up too much time in presenting his subject. If, before taking the floor, he is informed how much time is at his disposal he will almost invariably come within the prescribed limit.

A frequent error is the overloading of the program, which prevents the thorough discussion of the questions that are presented. The audience should have time for and be encouraged to take a part in the discussion of the several questions presented. Sometimes the program committee makes the mistake of not sharply limiting the time of local workers. It is always best to suggest to each one who is invited to take a place on the program the time limit which he should not exceed.

The ideal Institute chairman is not only a successful farmer, but an intelligent, public-spirited man who appreciates the honor of being at the head of the Institute work in his county. He will cheerfully devote time and energy to the prosecution of said work, and he will, whenever practicable, visit meetings in adjoining counties with a view of getting pointers to aid him in the further promotion of the work in his own county.

Experience has shown that a full attendance at the beginning of an Institute almost insures a successful and enthusiastic meeting, and this emphasizes with tremendous force the importance of advertising the meeting already referred to. Sometimes bad weather cuts down the attendance, although in many notable instances where the meeting has been well advertised and good roads are found, inclement weather has had slight effect either on the attendance or the interest manifested.

Bad roads are one of the greatest drawbacks to successful Institutes in southern Indiana. The value of good roads in promoting the Institute work and the productive industries can hardly be overestimated, and these facts should serve to array every Institute worker on the side of good roads, without which the highest success in the Institute work and the highest prosperity of the farmers are alike unobtainable.

LINES OF WORK.

In addition to the practical farm topics, including care of the soil, manures and fertilizers, crops and principles of cropping, rearing and care of live stock, growing and marketing of fruits, etc., questions pertaining to the home, education, rural improvements, free mail delivery, life in the country, and the social and political status of farmers were frequently discussed. Many papers were presented on poultry and poultry-raising.

Questions pertaining to live stock were discussed to some extent, but it is believed that more attention should be given to the importance and value of the live stock interests of the State. Institute workers, officers and program committees will do well to remember that live stock husbandry lies at the very foundation of a continuously prosperous and self-perpetuating agriculture. Dairying received much attention in localities, but the interest is not as widespread as it should be. With a soil well suited to the growing of all kinds of grazing and forage crops, and with unsurpassed facilities for marketing products, the dairy industry should take higher rank in the State than it now does.

An encouraging omen is the growing interest in agricultural education. There is a growing conviction among the farmers that agriculture in some form should be taught in the country schools; or at least that the children while in these schools should get an introduction to nature study, which will lead them to look with favor upon life in the country.

There was, perhaps, less discussion of the good-roads question than in some previous years. This is doubtless due in part to the fact that in localities where gravel is abundant the leading thoroughfares have already been quite well improved and partly to the fact that some other counties taboo the question for lack of road-building materials.

Of the questions which should receive large attention in future, the following seem to be especially important: Live stock husbandry in all its phases; good roads (a subject especially important in southern Indiana); utilization of waste and by-products; saving and applying manure; principles of cultivation and cropping; agricultural education for those who expect to farm; the farm home; how to lighten the labors of the farmer's wife, and how to increase the comforts, conveniences and attractions of rural life.

NUMBER OF INSTITUTES HELD EACH YEAR.

The Institute Act, as interpreted by the attorney-general, contemplates the holding of Institutes annually in every county in the State. An attempt was made, therefore, to start the work in every county the first year. When it was found impossible to accomplish this in so short a time, it was decided to take two years to inaugurate the work in the several counties. Despite the earnest efforts of the Superintendent, the work was not inaugurated in every county until the year 1893-94, since which time each county has held at least on Institute annually. The counties which did not exhaust the apportionment to local expenses on the annual Institute were permitted to hold second meetings when desired, and quite a number have done so each year, as will appear from the accompanying table under the heading of extra Institutes:

Counties holding Institutes in 1889-90, 50; extra Institutes.. 0
Counties holding Institutes in 1890-91, 41; extra Institutes.. 0
Counties holding Institutes in 1891-92, 90; extra Institutes..12
Counties holding Institutes in 1892-93, 89; extra Institutes.. 6
Counties holding Institutes in 1893-94, 92; extra Institutes.. 3
Counties holding Institutes in 1894-95, 92; extra Institutes.. 5
Counties holding Institutes in 1895-96, 92; extra Institutes..11
Counties holding Institutes in 1896-97, 92; extra Institutes..12
Counties holding Institutes in 1897-98, 92; extra Institutes..16

NEEDS OF THE WORK.

All who have carefully watched the growth and progress of the Institute work during the past nine years recognize that a great work has been accomplished. Notwithstanding this fact, all thoughtful, intelligent observers clearly recognize that only a good beginning has been made. The misapprehensions, prejudices, indifference, and even active opposition, which impeded the progress of the work at the outset have been largely swept aside. The more intelligent and public-spirited farmers have come to realize the beneficent purpose and value of farmers' Institutes, and all are rallying to the support of the work. With the gradual removal of the obstacles, and the increasing support of intelligent, public-spirited farmers, the work should make accelerated progress from year to year.

Unfortunately, the limited appropriation of $5,000 per annum does not permit the continued development and expansion of the work which its importance demands and which the favorable attitude of the agricultural classes makes possible. The growing appreciation of the importance and value of farmers' Institutes in promoting agricultural progress finds expression in an ever-increasing demand for the best equipped Institute workers who are, of course, the most expensive. In response to this growing demand for the best workers, the authorities of Purdue University have supplemented the State appropriation from time to time in recent years by paying first a part and then the whole of the salary of the Superintendent of Institutes and by sending members of the staff as Institute workers free of charge except for their actual expenses. The university authorities can not and should not be expected to draw upon other funds of the institution for the continued support of the Institute work. The demand for a larger fund with which to secure the very best Institute wrokers is growing more and more imperative each year. This demand might be met in part by cutting down the direct allowance to the several counties for local expenses. This seems to the Superintendent an unwise course, and will doubtless not be approved by the local officers. The only alternative, therefore, is to increase the State appropriation for farmers' Institutes if this work is to continue to grow. The work should continue to grow, first, because only by so doing can it remain alive and thoroughly successful, and, second, because the State should maintain its rank with sister States in this work.

While the work has been conducted in Indiana for nine years with an annual appropriation of $5,000, Michigan, after one year's experience with a $5,000 appropriation, increased it. Wisconsin first appropriated $5,000 and now expends $12,000 annually upon the Institute work. Minnesota expends annually $13,500, and New York $15,000. The amount appropriated for farmers' Institutes in Ohio has been increased from time to time until now $16,000 are available for this work.

With her favored geographical location, genial climate, fertile soil, unexcelled system of railways and her large farming population, Indiana should take very high rank in agriculture. That the possibilities in this direction may be realized the State should make a liberal and broad-gauge provision for the development of this her greatest industry.

Farmers' Institutes were specially designed to promote agriculture. and they have been conducted from the first with this end in view. The great success attained is shown in the fact that farmers' Institutes are now recognized as the most effective single agency in stimulating the farmers to increase the productive capacity of their farms, improve the quality of their products and thus increase their own and the general prosperity. By increasing the appropriation for farmers' Institutes our legislators would render a most substantial service to the cause of agriculture, which is the chief corner-stone of the prosperity of our commonwealth.

PUBLICATION OF INSTITUTE PAPERS.

The publication of papers by local Institute workers, which the State Board of Agriculture has courteously permitted from year to year in its annual reports, has proved advantageous alike to the State Board and to the Institute work. The reports of the State Board are eagerly sought for and read, and the local Institute workers have been stimulated to greater effort in the preparation of their papers. These papers have been selected by the county chairman. Each chairman was requested to forward the best paper read at his Institute. On the following pages will be found a larger number of these papers than usual, and it is believed that they will compare favorably with those published in previous reports. They are published without material change.

ACKNOWLEDGMENTS.

Acknowledgments are due and are hereby tendered to the agricultural and newspaper press for valuable services rendered; to the railroad companies for special rates of transportation for assigned speakers; to the local Institute officers who, with rare exceptions, have rendered most valuable service in their respective counties; to the assigned speakers for earnest, effective work; to the home workers in the several counties for valuable gratuitous services; to the business men of cities and towns for hearty co-operation in the Institute work.

In behalf of the general committee on farmers' Institutes the undersigned takes great pleasure in stating that the hearty co-operation of all who have had part in the Institute work during the past year is recognized and duly appreciated.

W. C. LATTA,
Superintendent Farmers' Institutes.

Lafayette, Ind., June 30, 1898.

THE FARM.

HOW TO UTILIZE THE CORN CROP.

BY T. A. WASSON, LOWELL.

[Read before the Lake County Farmers' Institute.]

The question of how to make use of this king of farm crops in such a way as to secure the largest returns for the outlay of labor is one of deep interest to those of us who are engaged in its production. Whether it is always to be consumed on the farm, or sometimes sold off, are questions to be governed by circumstances. It sometimes occurs that the market price is high enough to warrant putting it directly on the market; yet, we should remember when we do this that we are selling a part of the farm and should be careful that the price is high enough to pay for the grain and the depreciation of our land. The question of home consumption and how to make the best use of it on the farm is the one of greater interest to us. In the earlier days of our country, when the prairies and marshes were covered with grass that might be had for the cutting, there was not the need for economy of fodder that there has been in later years when the nearer approach of markets has given a market value to all kinds of feed. This necessity for economy has turned attention to saving the corn stock. Especially has this been so since chemical analysis has shown and experience has proved that the feeding value of the cornstalk is nearly equal to that of the best hay.

The manner in which corn can best be handled will depend somewhat on the surrounding circumstances and the use that is to be made of it. Those who are making a specialty of dairying, and are so situated that they can secure the necessary help, will probably find it profitable to make it into ensilage. I do not believe, however, that it would be advisable for the general farmer to attempt it; at least, not on a large scale.

Ensilage has its advantages. There are also some disadvantages connected with its use. It furnishes a palatable and juicy ration during the season when stock would otherwise be confined to dry feed, and if in good condition will be eaten up cleaner than corn fodder fed in any other way.

On the other hand, the silo must be filled at the time when farmers are all very busy putting their own corn into the shock, so that it would be difficult in most farming communities to secure the help necessary to fill a silo. It is heavy stuff to handle, both in putting it in and taking it out of the silo. Then, there is a risk of waste from rats or faulty packing.

From my own limited experience, I am inclined to think that the feeding value of ensilage is sometimes overestimated by some of its enthusiastic friends. I tried some one year, and when I came to feed it was very much disappointed. It was run through a husker that took off the ears, the same as it did on the dry fodder. The cows were fed the same amount of grain that had been fed with the dry fodder, yet there was no perceptible increase in the milk. The only advantage was that they ate it a little cleaner.

The huskers that are now in use put the fodder in nice condition to feed to any kind of stock. The only objection to their use is that at their present prices for work they are too expensive to be used extensively while farm produce remains at the present low prices.

There is reason to hope, however, that the improvements in that kind of machinery, together with increased competition, will soon materially reduce prices. In cases where farmers are so situated that they can, it might be economy for several to combine and purchase machinery of their own. Three years ago last fall four of us purchased a second-hand horsepower and a four-roller Milwaukee husker that had been used one season for a little less than $250. We have taken care of four crops of our corn with it, besides using the power to do our grinding and wood-sawing. The machinery is still in fair condition. Old threshing machines are frequently used to advantage on shock corn, breaking up the fodder and shelling the corn, the work being done much cheaper than by the husker. The objection to this method is that the shelled corn is not sufficiently dry at the time when this work must be done to be safely stored in large quantities. This objection is sometimes overcome, where the corn is to be fed, either whole or ground, by mixing oats with it when it is put in the bin.

But it is a question whether, at the price of feed, and of labor, it is not better to feed more of it on the stock than is usually done. There is no better feed for fattening cattle, especially in the earlier stages of feeding, than shock corn. It also makes good feed for cows or young stock that are to receive some grain. Where it is intended to feed it in this way, it would be better to plant a little thick, and not too large a kind of corn, so that the ears will not be very large. It can be stored in barns or stacks just as readily as though it were husked. If not cut with a binder, it would be better for convenience of handling, to tie in bundles. Late corn may often be handled to advantage in this way. Sweet corn is sometimes planted for this purpose and makes very nice feed. Some time since I read of a successful Wisconsin dairyman who depended almost entirely upon this kind of feed, and was able to carry 60 to 70 cows on a 200-acre farm. If I remember right, he ran it through a cutter before feeding.

In regard to the pros and cons of the profit of grinding and cooking corn for different kinds of stock, I feel hardly competent, from my own experience, to discuss them.

I am led to believe, however, from the reports of experiments made to determine their value, that I have read, that it pays to grind for cows and calves, and for pigs to the extent of making slop for them. That the principal advantage of cooking comes from having the food warm in cold weather, at least the extra advantage does not pay for the labor where grain is cheap.

Perhaps some of you may have noticed items in the papers lately in regard to the new product—cellulose—that is made from the pith of the corn stalk. It is said that it can be produced very cheaply; that it is the most perfect nonconductor of heat known—may easily be rendered fireproof; that the uses to which it may be put are almost without limit, extending from coating battleships, making pavement, lining buildings and covering steam pipes to the manufacture of the many small articles for which celluloid is now used.

If a fraction of these reports are correct, this discovery is likely to have an influence on corn production in the future.

ORCHARD GRASS.

(*Dactylis Glomerata.*)

BY B. A. BARNETT, CHARLESTOWN.

[Read before the Clark County Farmers' Institute.]

In the growing of this crop, the first thing to be considered should be good, clean seed, free from all weed seed and short straw.

The best time for sowing, I consider, is the last of February or the first of March, sowing early in the morning, when there is no breeze and when there has been a light freeze of from 3 to 5 degrees and the ground is honey-combed, the same that all spring seeds should be sown, as clover, timothy, etc.

I sow from three to four quarts of clover seed with one bushel of orchard grass per acre. Most farmers sow by hand, but I prefer the "Little Giant Broadcast Seeder," with which I can sow from two to two and one-half acres of orchard grass and three to four of clover seed per hour.

We generally seed to orchard grass with winter grain, unless it be in woodland, where it pays well to sow the seed on all open places where the leaves of the trees do not drift and remain on the ground. Orchard grass sown in this way (if the land is in good condition) will produce a good crop of hay the first year, and the clover will leave the ground in good heart, with a good supply of nitrogen for the next crop or two. But this young orchard grass should not be pastured after this crop of hay has been cut off, for I fear that right here is where a great many farmers make a mistake and destroy what would have made a good stand.

At this time the young plants have not made sufficient root growth and the stock, in grazing, pull up the root and thus destroy the plant.

Orchard grass should be rolled every spring about the time there is no more freezing, and in this way there will not be the clumping so much complained of.

The seed of orchard grass is ready to cut just before wheat, generally, and cannot be delayed; for, if the seed gets too ripe, it shatters and is lost in handling. The cutting is now generally done with the self-binder, and the bundles shocked three or four in a place and their tops tied together with a band of the grass, to keep the seed from losing, and when hauling, the whole shock can be picked up at one time with a fork and placed on the wagon, upon which there should be a sheet of some material to catch the shattered seed.

The threshing of the seed is where more seed is spoiled than in any other way, and no one but a professional orchard grass thresher should be allowed to do the work, if the seed is to be sold for foreign shipment. If the threshing can be done in two or three weeks after cutting, the seed can be left in the field, but otherwise it had better be stacked at the first opportunity. The yield ranges from eight to twenty bushels per acre.

After the first seed crop has been cut, the aftermath may be cut for hay, or may be pastured until winter, but should not be tramped by stock when the ground is soft, and should not be pastured early in the spring if a seed crop is to be taken that year. Orchard grass does not seed upon all kinds of soil—it does best upon our red clay limestone soil.

The seed grown in Clark County is considered the best grown, and a higher per cent. of it will germinate than any other seed. Eighty-five to ninety-five per cent. of our own seed will grow, while the fine looking seed from New Zealand only about sixty-five per cent. will grow.

Where seed is grown and the aftermath cut or pastured year after year for eight to ten years, without manure or fertilizer, the crop is very hard on the land; but, with good top dressing, the crop can be grown for ten years without reseeding.

I believe there has been more clear money made by the farmers of Clark County in the last three years in the growing of orchard grass than in wheat.

THE CARE OF THE ORCHARD.

BY C. W. DUNCAN, BEDFORD.

[Read before the Lawrence County Farmers' Institute.]

The southern part of the State of Indiana, and especially Lawrence and adjoining counties, is particularly blessed in its adaptability to the growing of choice apples. The lay of the land, nature of the soil, natural drainage and climate, all are most favorable to this branch of horticulture. The railroad facilities are such as to permit us to place our apples in any of the best markets of the country. Unfortunately for ourselves, only a few of us have awakened to the possibilities of this locality in that line. A few of our farmers have embarked in that business and are meeting with the greatest success, thus proving conclusively what I have affirmed.

The general verdict is that there is no money in apples. That is all too true, for the simple reason that we do not, as a rule, grow such apples as the market demands.

I am not in possession of data on which to base my assertion, but I am sure that not one in a hundred orchards in this county is managed in a way to produce apples for which there is a demand at remunerative prices. When the apple grower has learned that to bring about the best results, as much care and good judgment may well be given to the orchard as to the production of corn and wheat, then good, old Lawrence County will become one of the banner apple counties of the United States.

As it now is, having decided to put out an orchard, we proceed to interview every nursery agent and catalogue that falls into our hands, until we find a job lot of trees at a genuine bargain. Of course, we purchase the trees, even if the greater portion is not of desirable varieties, because they are cheap. We select a hillside or other exposed place, stake off the land carefully that the rows may be perfectly straight, put down holes with o post-hole digger, double up the roots and jam them in, throw in the dirt and press it in with the foot. Having done all that any reasonable person would expect to do for an orchard, we go home and, placing our tired form in an easy chair, with our feet on the mantel, and a cob pipe between our teeth, we boast of the abundance of apples we are to have in a few years at such a small cost of time and money. When the orchard comes to bearing, then the wail goes up that apples don't pay.

Let us ask our fathers and grandfathers about the apples of their young days, and they will tell us that, while we now have many choice varieties that were not then dreamed of, yet the good, old-fashioned apple is not, as a rule, nearly what it used to be. It does not attain the same size or the same rich color, is affected by scabs and knots, that were unknown to the luscious and exquisitely flavored specimen, the delights of which they remember so well. Can we not produce as good or better fruit than they did in those days, if we bring about the same conditions? Certainly. Therein lies the necessity of attention to the orchard.

Let us first see what were those conditions. The first was the humidity of the soil caused by the natural drainage through those natural outlets, the decaying roots. Then the abundance of decaying leaves that had been accumulating and giving their wealth to the soil, not only adding to its natural fertility, but making a most effective mulch.

Last, but by no means least, was the absence of the insects which are now playing such sad havoc with our trees and sending so many apples to the cider mill and pig pen. Let us not deceive ourselves by thinking that those insects were not then in existence. The most of them were then with us, only awaiting the thinning of the forests to swoop down on the orchards with their miniature engines of destruction.

Now, to come to the point, how are we to manage our orchard, granting that proper care has been given to location, selection of the proper soil in regard to fertility and drainage; the stock having been selected with a view to the purposes for which the fruit is intended, and carefully put out?

It is now generally conceded that the orchard should be planted in corn for the first four or five years, care being taken to plow shallow, not deeper than three or four inches, and not close enough to bruise or bark the trees. The cultivation should also be shallow and frequent enough to insure a perfect mulch. This cultivation is also most valuable in increasing the available food supply of the soil. It should not be continued later than the middle of July, as late cultivation is liable to induce a late growth of the tree, which must be avoided.

While the orchard is in corn let us remember that all the fertility of the soil is needed to properly develop the young trees. It is, therefore, desirable to either hog the corn down, or, if the corn is removed, to apply enough fertilizer to more than make up for that taken off in the corn.

After the fourth year the orchard should be clovered for two or three years. The best method is to pasture hogs on the clover until the apples ripen enough for use, and in the meantime feed the hogs on the poorer parts of the orchard. This will not only add to the fertility of the soil, but will prove a most effective method in dealing with the insects and other pests in the apples that fall before they are ripe. The clover that remains on the ground after the hogs are removed should be mowed down and allowed to rot where it lies. When ready to plant in corn again, do not fail to plow under a good crop of clover. Continue to alternate between corn and clover until the orchard is ten or twelve years old; then, in place of the corn, substitute clean cultivation.

There are many implements on the market intended especially for clean cultivation, but care should be taken to select one that thoroughly pulverizes the soil and does not work deep enough to disturb the roots.

Let us remember that the production of choice apples depends almost as much as corn on the fertility of the soil, and is almost as exhausting. Therefore let us use fertilizers. Barnyard manure is good, but cannot generally be made in sufficient quantities for more than a small home orchard. But we can raise clover, and that answers the purpose admirably. Where artificial fertilizers must be used, let us remember that the element most needed is potash, which is found in abundance in wood ashes. The next in importance is phosphate, and the least in importance and the most expensive is nitrogen; so it behooves us to select a grade containing much potash and phosphate and little nitrogen.

No general rules can be laid down for pruning the orchard. The different varieties, different shaped trees of the same variety, each require different treatment. In this must be used good judgment and much thought. I would suggest that the trimming be done in such a way that no large limbs will have to be removed, as this is a very great drain on the vitality of the tree. From the time that the trees are set out they should be pruned each year; then, if you know what you want, you may be able to train the trees to reasonably near your ideal without sacrificing a great amount of growth. Never allow a tree to fork, if it can be prevented, as it will be almost certain to split when heavily loaded. The ideal tree is one with a central stem, and with the branches growing at regular intervals from this stem in such a way as to perfectly balance the tree.

In the production of good, marketable apples, spraying with insecticides and fungicides is of the utmost importance. Many preparations have been used and recommended as fungicides, but the one now generally conceded as the best is the Bordeaux mixture. This mixture, which is death to the apple scab fungus, should be applied not less than three times. It is first applied when the fruit buds are opening. The second application, with the addition of one pound of paris green to from 100 to 250 gallons of the mixture, should be made immediately after the flower has fallen. This application is not only effective in destroying the scab, but by the addition of the paris green kills the larvae of the codling moth, which is at that time eating its way into the fruit from the bud where the egg was deposited by the parent moth. The third application, which is the same as the second, should be made about two weeks later. This finishes the scab, destroys the worms of the late moths and also the many destructive insects that are then at work on the leaves and the fruit.

Many authorities recommend as many as four or five sprayings, but I feel that with only three applications the per cent. of knotty, imperfect fruit would be decreased so much that we would feel ourselves amply repaid for the trouble and expense.

In apple-growing, as in any other business, the great principle is to know what to do and by all means do it at the right time.

THE ORCHARD AND ITS ENEMIES.

BY CLARENCE EMERSON, OWENSVILLE.

[Read before the Gibson County Farmers' Institute.]

Fruit-growing is a delightful, healthful and an elevating business. Continued association with Nature's best works develops the moral and intellectual faculties and gives buoyancy to the spirits and elasticity and strength to the physical powers.

We hope soon to see more time and labor devoted to this important industry, especially among farmers. It would promote the health and happiness of the people and the material prosperity of the country. It is an established fact that fruit culture increases with the civilization, intelligence and morality of any people. Husbandry is the renovator of social life.

It is presumed that the person intending to plant an orchard has carefully studied the matter and has fully decided what kind of fruit he desires to plant, and that he has satisfied himself that his markets, location and soil are adapted to them. He then inquires about the methods of preparing the land, the best place to purchase the stock, and the manner in which the trees should be set and trimmed.

Greater care should be taken in the preparation of orchard land than for any other farm crops, as it has to stand not only one but many years. All pernicious weeds should be removed, and all hard, sour places corrected. Orchard lands should be well drained either naturally or artificially, because they are not only warm and give up their fertility easily, but allow very early cultivation, which is necessary in the management of orchards. The ground should be plowed very deep before the trees are put upon it; and, in some cases, it may pay well to use the subsoil plow.

It must always be remembered that the tree agent has been the means of clothing the country with fruit trees, and thereby adding much to the contentment of farm life. But I should advise persons who expect to go into fruit-growing to buy direct of the nurseries.

The buyer should make up his mind what varieties he wants, then find the nursery which has them, and where there is good reason to expect reliable stock and honest dealing, and order early enough to get them. There is then no occasion to consider the vexed question of substitution of varieties.

It is generally best to buy first-class trees—those which are of medium size for their age, shapely, stocky, with straight, clean trunks, which are not stunted, and are free from borers, scale insects and all other injuries, and, in case of budded trees, those in which the union is very near the ground. In dwarf pears, especially, it is important that the stock, to be first-class, shall be budded very low. It is often thought that large size is of great merit in a nursery tree, but this is an error. Vigor, straightness, stockiness, firm, hard growth, are of much more importance than bigness.

There is much difference of opinion as to the relative merits of fall and spring planting. My own opinion is that fall planting is generally preferable to spring planting on thoroughly drained soils, particularly for the hardy tree fruits like apples, pears and plums; if the ground is in good condition and the stock well matured. The advantages of fall planting are several: The trees become established during the open weather of the fall, and they usually make a start in the spring before the ground is hard enough to allow of spring planting. This early start not only means a better growth the first season, but, what is more important, trees which get a very early hold upon the soil endure the drouths of midsummer much better than trees planted in the spring. Planting is nearly always better done in the settled weather and workable soil of fall than in the capricious days and in the hurry of spring-time; and the orchardist is free to begin cultivation at a time when he would otherwise be planting his trees. And, as we have already said, it is generally better to buy trees in the fall, when the stock of varieties is full and the best trees are yet unsold.

Trees are seldom set too far apart; they are wide feeders, and the best results are obtained when each tree stands far enough from its neighbor to possess an individuality all its own. An additional reason for sparse planting has lately become important—the necessity of spraying for insect and fungus pests; and for this reason, as well as to allow better cultivation, the outside rows should not be planted close to fences.

Making straight rows on large areas has been a difficult problem. This may be solved by the use of checkrower wire. Stretch it across the field at intervals the desired width of rows. Set the trees perpendicular opposite the buttons, which are the desired distance apart, and for convenience may have strings tied in them.

The purpose of trimming trees when set is to establish a balance between root and branch. Perhaps half the entire root system of the young tree is left in the ground when it is dug. It is therefore evident that the top should be cut back to a corresponding amount. In fact, the top should be more severely shortened than the root, because the root, in addition to being reduced, is also dislodged from the soil, with which it must establish a new union before it can resume the vital activities.

The peach tree is generally cut to a straight switch about knee-high, and the top formed on that. The apple, pear, plum and cherry probably do better if about five branches are left some four or five buds in length, unless they are very slender, when it is better to cut as the peach, to form a more stocky trunk.

After the land has been planted to orchard, and two or three crops of corn are grown with ordinary corn culture—preceded by rather deep plowing, in order to send the tree roots deep into the soil—leaving the stalks to rot and return so much fertility to the soil, some good spading or disc harrow should be used from early spring until the first of June, going about three times each way, which is equal in cost to a little more than one good plowing, but is the very best cultivation that could be given it. At the last going over with the harrow about one bushel of cowpeas should be sown to the acre. The peas are soon up to shade the land through the heat of summer, and have ample time to make a good crop, which comes very handy to hog down in the fall. In this way the fertility of the land is not only increased by the pea roots reaching deep into the soil, and storing up large quantities of nitrogen, but also by the manure of the hogs being thoroughly distributed. It has been demonstrated by repeated practical tests that this plan is as good for the fertility of the land as plowing under the crop while green; besides, it cheapens and simplifies the work of the entire year.

There seems to be two classes of organisms at work to injure our fruit crops. The first of these are noxious insects, and the second parasitic fungi.

Why do insect pests and diseases increase as the country becomes older? is a question often asked. There are no more insects now than there was at the Creation. Civilization has destroyed the balance between insects and vegetation. In other words, man has destroyed their natural feeding plants, and they have been forced to accept other plants as food. As the orchards are fast taking the place of the forest, it is quite natural that they should take to them.

Insects are divided into two groups—external and internal feeders. The internal feeders, such as the apple, pear and peach tree borers and the bud moths, are very hard to fight.

There are two kinds of apple tree borers, the round and the flat-headed. The flat-headed is the most destructive. It attacks trees that have in some way been injured. They lay their eggs in the southwest side of the trunk. These hatch out about the first of May. The peach and pear tree borers work under the bark just beneath the ground. The presence of the former may be detected by the wax secreted by the tree, the latter by the shavings it throws out. The borers may be prevented by rubbing the trunk of the tree with soapsuds or carbolic acid just after the eggs hatch or during the month of May. The bud moth lays its egg upon the tender leaf buds, the larva eats its way into the leaf stem. Hand-picking is the surest remedy.

The external feeders fall under two principal heads, based upon the manner of their taking food, viz., whether they are biting or sucking, each group involving a special system of treatment.

The biting or gnawing insects are those which actually masticate and swallow some part of the solid substance of the plant. They include many beetles, the locusts and a large number of injurious larvae, among which are the canker-worm, the tent-caterpillar, fall web-worm, the green fruit worms, the cigar-case bearer, the pistol-case bearer, and last, but not least, the plum curculio and codling-moth.

The codling-moth is the terror of the orchard. It comes with the apple blossoms in May and breeds twice in a season. It deposits its egg in the spring upon the blossom end of the young apple. From this egg there hatches a caterpillar, which eats its way into the core of the apple and continues to feed upon the pulp until it has finished its growth, which takes three or four weeks.

The curculio is the enemy of the stone fruits—the plum, cherry, peach, etc. They are destroyed by jarring the tree and catching them upon a cloth.

For these insects, direct poisons, such as the arsenites, which may be safely applied to the leaves or other parts of the plant attacked, and which will be swallowed by the insect with its food, furnish the surest and simplest remedy, and should always be employed, except where the parts treated are themselves to be shortly used for the food of other animals or of man.

The sucking insects are those which injure plants by the gradual extraction of the juices either from the bark, leaves or fruit, and include the plant bugs, plant lice, scale insects, thrips and plant-feeding mites. These insects possess, instead of biting jaws, sucking beaks or bristles, which are thrust through the outer layers of the bark or leaves into the soft, succulent tissues beneath and used to extract the plant juices, with a resulting injury not so noticeable as in the first group, but not less serious.

It will be necessary to note but one of these, particularly, here. That is the scurfy bark louse, one of the scale insects, a small white insect less than a tenth of an inch in length. It is generally distributed southwest of Owensville, and I would suggest that the owners of infested trees cut down all dead trees and cut out all dead or dying branches and burn them, in order to destroy all the eggs possible. They hibernate in the egg and their time of hatching is from the middle to the last of May. The young are slow to settle and their scale at first is not very dense. Therefore, one, or at least two, applications of kerosene soap emulsion, diluted in ten parts of water, made about the first of June, will hold this species in check.

For this class of insects the application of poisons, which penetrate little, if at all, into the plant cells, is of trifling value, and it is necessary to use substances which will act externally on the bodies of these insects, either as a caustic or to smother or stifle them by closing their breathing pores, or to fill the air about them with poisonous fumes. Wherever it is not desirable to use poisons for biting insects, some of the means just enumerated will often be available.

The word fungi is applied to a vast family of cryptogamous plants—that is, flowerless and nearly all parisitic or having no roots, but drawing their support in whole or in part from whatever they fasten upon. The most familiar form to us, as farmers, is the smut found among our wheat and oats and on our corn.

This dust is so fine as to be able to enter the pores of the bark or even the solid wood of the tree. Where fruit trees are affected to any extent by fungous diseases, the circulation is poisoned; leaves shrivel, turn brown or fall too early. The fruit also falls too early, or what remains is disfigured and much of it worthless. Worse than this, there are many fruit trees destroyed by this disease.

During the past few years numerous solutions, powders, etc., have been tested, with a view of determining their value as economical, effective and practical preventives of fungous parasites. While a number of these preparations have promise of value, none have been found which fill so many requirements as Bordeaux mixture and the ammoniacal solution of copper carbonate. Of the two preparations, Bordeaux mixture has long been recognized as possessing the most valuable qualities, and it is probably more generally used to-day than all other fungicides combined.

Of the several diseases of the apple amenable to fungicidal treatment, scab, bitter rot and the powdery mildew may be mentioned as probably the most serious.

Apple scab not only renders the fruit unfit for market, but also kills the trees in many instances.

The bitter rot fungus often continues its destructive work after the fruit is harvested; care should be taken in storing to remove all fruit showing evidence of this disease.

Powdery mildew is injurious to nursery stock, especially to seedlings.

The pear is subject to attacks of three destructive diseases amenable to fungicides, namely, scab, leaf blight and crackling.

The plum, cherry and quince are all subject to leaf blight, a disease due to different fungi, but amenable to the same treatment.

Ere I close these remarks, I would call your attention to one other kind of fruit that may be produced upon the farm. This fruit is different from all others, and yet, perhaps, is the most valuable. It may be cultivated and grown successfully by encouraging and educating our boys and girls to take an interest in growing fruits and flowers. There is something in the study, propagation and growth of fruits and flowers that elevates us to a higher and nobler sphere in life. To plant the seeds and watch the growth of the tiny plants as they start into life, teaches us lessons of patience and dependence upon an all-wise Creator. It gives employment as well as recreation to our minds, and brings sunshine and gladness to our hearts; drives cares and sorrows away and fits us for the sterner duties of life. Our children will be fruitful in love of home and country, contented, happy and useful in life. I will now leave you to seek and destroy all the enemies of this last and best of fruits.

RASPBERRY CULTURE.

BY L. N. MAHAN, TERRE HAUTE.

[Read before the Vigo County Farmers' Institute.]

In a brief study of raspberry culture it would be almost impossible to introduce anything entirely new. It is like journeying over a much traveled highway, although it may be new to the traveler of to-day, as it was to those of yesterday, and will be to the traveler of to-morrow.

Horticulture has been called "The Poetry of Agriculture." The general principles are the same, and the terms as applied indicate a natural division of labor modified for convenience. Together, they are the principal sources of the food and clothing supply of the world and the basis of our present civilization.

In the cultivation of plants it is both pleasant and profitable to trace them to their "native heath." Much can be learned of their habits and essential conditions that would otherwise be learned by tedious and costly experience.

The raspberry is grouped in the natural order Rosaceæ. From this we infer it is somewhat related to the rose family. It is in the genus or family division Rubus. The division Rubus includes many species of mostly trailing or upright shrubs, several of which bear red berries; hence the name Rubus or red.

Two of the most important of the fruit-bearing shrubs are the Rubus Villosus—the high-bush blackberry so common almost everywhere, and the raspberry, with its almost endless variations of names, colors and characteristics. The Rubus Idaeus is the native red raspberry of Europe. It is found growing in various localities there, but takes its specific name from Mt. Ida, in Crete.

The foreign varieties are said to be much finer flavored than our native kinds, and many attempts have been made to introduce them. So far as is known this has not been successfully done. It is claimed they are too tender in our variable climate, unless protected from the extremes of drouth, heat and cold.

Seeds of foreign varieties have been planted. The Brinckle orange originated in this way is thought to be highest flavored of all raspberries. Unfortunately, this is also too tender for general field culture.

The Caroline, a seedling of Brinckle's orange and a native yellow-cap, is hardy and productive, but lacks the full, rich flavor of Brinckle's orange. We have referred to this subject at some length, thinking there is some unfinished work here and a promising field for further experiment.

Our native red raspberry, Rubus Strigosus, closely resembles the European varieties and takes its specific name from the spines or bristles on the canes and leaves. It is found growing in hedges and woodlands all over the New England States and as far west as the Pacific coast. Many excellent kinds are under cultivation and some improvement noted. The chief difficulty is, they are too soft and watery for transportation.

The Turner and the Cuthbert have been the main crop berries. They are nearly identical, though the Cuthbert is claimed to be later and larger. Both varieties are vigorous growers, quite hardy and productive of fine fruit for home use and near-by market.

Rubus Occidentalis is our black-cap raspberry. This is peculiarly an American variety, as it is a native of no other country, hence its specific name indicating its western origin.

The many varieties of this berry are easily grown, succeeding almost everywhere, producing abundant crops of fine fruit that are quite satisfactory for shipping to wholesale markets.

Larger fields have been grown in southeastern Indiana, southern Illinois and elsewhere for the northern markets. The center of activity appears to be moving southward as transportation becomes more swift, and we shall expect Tennessee, Alabama and other Southern States to capture the early and profitable trade, with California and the Pacific coast to hear from.

The species named are probably all that are so distinct as to be easily recognized. There are, however, many hybrids and crosses, bearing fruit of almost every tint of the rainbow in color. Scientists differ as to whether there are any distinct species in the list.

The Shaffer, Colossal, Columbia and many others are well known types of this class, and are quite popular in some localities. We believe these variations are encouraging and may lead to further improvement. All the red raspberries sprout from the roots. Any plants not needed for fruiting or planting out should be treated as weeds. The fall season is preferred for setting new plantations of the red kinds. They should be well covered and it is well to mulch with compost to avoid extreme freezing.

The blackcaps are propagated from the tips or ends of twigs. These should be buried two or three inches deep, in the fall, when ground is getting cool and moist. The plants should be properly rooted for the following spring, which is decidedly the best time for planting this kind. The hybrids usually sprout from the tips, also from root cuttings. All kinds are easily grown from the seeds. If you care to try it, take fresh berries, mash in dry sand, to absorb moisture, scatter this over a well prepared bed, cover lightly with sand and compost, keep warm and moist. Be careful to keep the surface from getting dry, as this would destroy the vitality.

This process will apply to strawberries, blackberries and other kinds of berries. Perhaps, only a small portion of the seedlings will resemble the original variety, and you may get even a variety of color, especially in raspberries.

If you are thinking of planting raspberries, you will first inquire if it will pay you to do so. If for home use, it certainly will. No one can afford to deny themselves such a luxury, and especially when it is so easily within the means of all who have a garden. Plant some of the well-known kinds, in variety. If you plant for market, you will do well to study the situation carefully and make haste slowly. Under present conditions profits are small at best and in some localities have entirely disappeared. A commission merchant informed us of large sections of country that consigned their fruit to Chicago last year, with a net result to the grower of 10 to 20 cents loss on every case sent. Many growers were reported hopelessly in debt and whole neighborhoods impoverished with this worse than failure of crop.

It has been said over and over again, "there is plenty of room at the top." We have often wondered how it would be if we would all get there!

Perhaps we would break the top off and all come down together, or else some one would have to come down off his perch. No doubt the fellow at the top takes this view of it, as he is usually more anxious to pull the ladder up after him than to extend a helping hand to the fellow below. As a business proposition it is not safe to invest time nor money in any enterprise, whether the mining of gold or growing of fruit, where the few succeed and the many will fail.

FLORICULTURE.

BY LOUISE M'CLANAHAN, SULLIVAN.

[Read before the Sullivan County Farmers' Institute.]

It is presumed that humanity desires happiness, and is in search of that which may be the source of it. In the growing of flowers there is a fount of pleasure which this life is too short to exhaust.

There is not a moment of our lives but the garden is teaching us some important and highly valuable lesson. We learn from it how to live rightly, that we may enjoy the full measure of life's pleasures and blessings.

The beautiful and good is with us and around us; the evil and false is just as common; we have our choice, and can find whatever we look for, and see what the mind craves.

The person who sees nothing in summer's sun but heat, nothing in winter but cold and discomfort; if he sees nothing in a tree but the fruit it bears or its value for wood and timber, he will have a cold and stormy sunset.

Every tree, shrub and plant has a beautiful story to tell us, if we will but listen. Nature's secrets are past finding out, but its beauties are the inheritance of all who seek them.

"Not a tree, a plant, a blossom, but contains a folio volume we may read, and read, and read again, and still find something new, something to please and something to instruct."

It is said, of all nations, the ancient Greeks were the most passionately fond of flowers, cultivated them generally and associated them constantly with their lives.

Nothing in Greece could be done without flowers—typical leaves, plants and trees accompanied every rite and gave special character to every event. No child could be born, no maiden wooed, no sick man die, no bride taken home, without typical flowers, while every religious festival had its distinctive object denoted, and its special character preserved, in the chaplets, garlands and flowers by which it was accompanied. The rose dedicated to the "God of Silence," and placed above the tables, was a significant hint that what was heard there was not to be repeated. Greece was the foremost place in all the world for flower culture, to which nothing in modern times can be compared.

In Normandy almost every home, the poorest and most pretentious alike, has its plat for flowers. The front walks are often carefully graveled and bordered with shells or shining white pebbles; then there are always flowers—zenias, mignionette, petunias, asters and geraniums—for the "habitant" loves flowers.

You may see it in the cities, in window gardens, where vines and simple blooms run riot; and in the country you will see an even greater profusion, some of the verandas being banked with them, leaving no room to walk or sit, but presenting a mass of petaled splendor, which shows they appreciate the attention they receive.

Our attention is also attracted to the fact that no other country of its size on the face of the earth has so enriched the list of desirable ornamental plants and valuable fruits as the little country of Japan, and almost every introduction possesses the merit of sturdy, vigorous growth, extreme hardiness, and remarkable exemption from disease of any kind.

The Japanese do not speak of flower shows and exhibitions as we, but of flower viewing; and this viewing is not limited to any special season, as our great displays of autumn. but occur at various seasons throughout the year. Iris-viewing, lotus-viewing and wisteria-viewing are excursions which are a part of Japanese life. The chrysanthemum-viewing takes place on the 9th of October, and the varieties of this favorite flower of the Japanese are numerous, and vary greatly in color, size and form.

But we are glad to know that our own country is progressing in floriculture. This is shown by the many new types which are being introduced, and by the great autumn displays which are being made in our cities.

Each year brings forth its great production of chrysanthemums, and each exhibitor tries to excel in beauty the display of his competitor. Flower growers in this country are taking the most enthusiastic interest in this especial flower and expect to display wonderful possibilities in the coming exhibitions. Throughout the months of September and October the "Queen of Autumn" is the flower upon which is centered the best efforts of the floriculturist.

But we must acknowledge we are sadly lacking in the general cultivation of flowers. It is our duty as individuals to engage largely in their cultivation, for in that we enhance the beauty and attraction of our homes. We should also engage the children in this work. It will be a continual surprise to watch the child who is once interested in it; the time seems very long until they see the little green plant come from the seed they have sown; then how they watch for the first bud, then the development of the wonderful flower!

Perhaps if the boys were enlisted more in this work they would not find time to idle away so many precious hours in learning ways and habits which prove a serious detriment to their future progress, for in a bed of flowers they may learn the lessons of patience, sobriety and truth.

Boys, as a rule, admire flowers, but are ashamed to own it, because they cherish the idea that the love of flowers is a feminine instinct, and to manifest an interest in them makes them appear girlish and detracts from their dignity. Many of the noblest men the world has ever known were passionately fond of flowers, and were not ashamed to be seen wearing "a buttonhole bouquet."

We have sometimes heard people deride the idea of fashions in flowers. This can not be called a new fad, however, for in Napoleon's time a violet winter attracted more attention than has since been given this very popular flower.

There is so much of beauty and loveliness in flowers of all kinds that we often wonder why more attention is not given to their cultivation. True, our time is taken up largely with the more important duties of life; nevertheless, the care of a few flower beds would afford to the members of the family much needed recreation. A walk bordered with tulips, with syringas growing back of them, and with honeysuckles twining the trunks of the shade trees, is one of the fairest sights in spring-time, in one of the prettiest gardens of Newport—that of the Astors.

Lady Churchill devotes a portion of her time to the cultivation of her roses, and in her present country home, a small place just outside London, she grows them not sparsely but in great fields, and from her veranda they spread out like the perfumery fields of Nice.

This may sound quite pretentious for a small yard, but as a small yard is a part of the whole which constitutes a trim or slovenly view, it is certainly obvious that the small yard should furnish its share of trimness and prettiness. If flower beds were made of pretty shapes, and proper distances apart, and if some reference to harmony of color and relative size were used in the selection of the plants to be grown in them, how pleasing the effect would be to the eye!

But many will say, "I have no knowledge of floriculture." This can easily be obtained by procuring some of the many magazines on floriculture.

We have often thought one source of discouragement to the amateur who loves and cultivates plants was in not knowing every step of the way in the cultivation of some favorite. One of the most pleasant phases of floriculture is when we sit down in the evening and open a lot of new floral catalogues. The genial warmth and bright light of the glowing fire makes the crisp cold on the outside seem far off, and one revels in the lovely new plants that are illustrated in them—the new roses, the dainty sweet-peas, bright-faced pansies, and gorgeous new chrysanthemums.

But pleasure is not the only thing that has been gained by these cozy times with the catalogues; we have gained much knowledge, for they are great floral educators. In them we learn of many new plants, their method of treatment; pests, and their cure, and numberless odd bits about floriculture; for to be successful we must study the subject.

There are many things that seem like a bother to some, but folks who don't want to be bothered are not the ones who succeed with plants. It has been iterated and reiterated that proper drainage is essential, but some seem to think this a needless precaution. Chinese lilies, callas, parrot's feather and some others like to stand with their toes in the mud like a bare-footed boy, but there are many others which need good drainage and a sweet soil—among them may be classed roses, geraniums, begonias and primroses.

In regard to special soil for special plants, we cannot always know, but there are some plants that have such a decided liking for certain soil that it is not difficult to soon determine that in which they flourish most favorably.

Nearly all plants have the power, to some extent, of adapting themselves to their surrounding conditions. Those who have best success with plants, however, usually keep them clean, well fed, and are systematic and regular in their care of them. In window gardening, the main point is to secure thrifty, healthy, vigorous plants, to master the details of watering, showering and fertilizing and of keeping them free from insects. Plants, well fed and well tended, with every faded leaf picked off, the soil in the pots kept free from crust or hardness, will bloom in winter, and cannot fail to gratefully repay us. The winter window garden is intended to imprison a bit of summer's brightness and keep it for our delectation throughout the long and dreary winter. The window garden should be a picture, a living, growing picture, if you will, a garden of delight, charming us with its ever-changing growth and development and its successive unfolding of radiantly beautiful flowers.

The object of our paper has been not so much to advise as to the care and treatment of plants, but rather to increase, if possible, the interest in their general cultivation. Therefore, we would admonish our citizens, both in city and country, to engage more largely in the cultivation of the "beautiful."

LIVE STOCK.

CATTLE.

BY W. H. GOODWINE, WEST LEBANON.

[Read before the Warren County Farmers' Institute.]

Handling cattle is not a business of itself any more in this country. It used to be carried on to some extent by men who were not farmers. When the country was unsettled we had free range without limit on the prairies of the finest beef-producing grasses the world ever knew. Summer grazing cost comparatively nothing; winter feed plentiful and cheap. Cattle handled in large bunches, and margins broader. But conditions are so changed that there is no profit in this mode of handling them. It is now simply an adjunct to the farmer.

It is necessary, in order to keep up the fertility of the farm, to handle all the stock it will support. Land in pasture never wears out; in grain it will. The question is now, how to keep in the best condition the farm and make most out of it without loss on the stock.

Let us compare the most popular method advocated by all agricultural papers—that of "Early Maturity"—against the other, of more grass and less grain—more age and less expense.

With age you may mature fairly well on grass alone. Three-year-olds will fat fairly well, four-year-olds much better. It is a question whether it pays to try to mature any age on grass alone. Let us compare the two methods. Let us take a good, well-bred yearling, say 800 pounds, at eighteen months old, at $4 per hundred, or $32; feed 120 days (that is, about as short a feed as you can make and get him fat); count corn at 20 cents per bushel and a gain of 4 pounds per bushel feed—say 50 bushels—would be 200 pounds. Now, your steer weighs 1,000 pounds; that at $4.50 per hundred equals $45. Purchase price, $32; corn, $10, equals $42 total cost, against $45 sale price; or $3 for hay and profit. A pretty even deal.

Let us go back and start with the yearling—800 pounds at 4 cents, $32; first four months, grass and stalks, $3; next three months, hay, $5; six months' pasture, $6. We are now at the end of the first year, with a cost of $46. First four months of the second year, $4; next two and one-half or three months, hay, $4; add 20 bushels of corn at 20 cents, $4; six months' pasture at $1.25, $7.50—a total cost of $65.50. You see we started with 800 pounds, say October 1; we should gain 400 pounds in one year. With this calculation we have 1,200 pounds at the end of the first year; and by my plan of feeding a little corn, the second year we ought to gain 450 pounds, which, added to the 1,200 the first year, makes 1,650. That, at 4½ cents, equals $74.25, or $8.75 over pay for a lot of unsalable stuff—stalk fields, etc. Some may question my estimates on gains, but a well-bred animal wintered after this fashion ought to gain 100 pounds; and good summer grazing is not high at 300 pounds for two-year-olds. The second year I added 50 pounds on account of having fed a little corn.

My figures will not show a profit for having fed the corn, except that it is almost impossible to graze them fat, unless they are warmed up a little in the spring on grain. These calculations are made for very good stock, but I think my comparison will hold good on any stock. The commoner stock will cost less money, gain less and produce less profit; in fact my experience is that the very common stock leaves no profit at most any price. This method of maturing beef will make a demand for more grass, which, at a rent of about $3 per acre, is about equal to my estimate in making this comparison. This I consider a better rent than the average rent for plow land, considering that you are building up instead of wearing out your land.

THE FUTURE OF THE CATTLE INDUSTRY.

BY GEORGE JEFFRIES, SATURN.

[Read before the Whitley County Farmers' Institute.]

It is ever the disposition of man to try to penetrate the future. Whenever any question or proposition of importance is presented to his mind, almost the first thing he does is to begin to theorize and speculate in regard to its effect in the future. This we believe to be all right and for the betterment of mankind. It augments our hopes, increases our expectations and stimulates us to greater exertions. This would be a dull and lifeless world, indeed, had we no future prospects.

To-day we are called on to look down the vista of time, and, so far as possible, judge the future of the cattle industry. By cattle industry, we wish it understood that we mean beef-cattle industry, from the fact that wherever the family has gone and located itself, there the milch cow has gone also as a necessary adjunct of the family.

Patrick Henry said, in his great speech, "I know of no way of judging the future but by the past." And we believe that declaration stands as applicable to-day as when uttered by that great patriot.

In order to get a prospective view of the cattle industry, we must take a retrospective view, as well as consider the present situation. In viewing the past we shall not enter into details, but simply state some general facts which have fallen under our observation.

Our recollection of the cattle industry extends back over a period of more than fifty years. Back to a time when the cattle industry was, comparatively speaking, in its infancy. We had not then become great consumers of fresh beef. We did not find in every town and village one or more meat markets where we could buy fresh beef seven days in the week for fifty-two weeks in the year. We had not then learned to ship to our foreign neighbors large numbers of live beeves and immense quantities of dressed fresh beef.

The great prairies of the West were not then stocked with large herds of cattle, but the buffalo and elk held a monopoly of those rich grazing lands.

Our facilities for transportation were so poor that what few cattle were marketed in the Middle and Western States cost more to get them to the place of slaughter than the farmer received for them. They had to be driven long distances to the river towns, where they were slaughtered, the meat packed and shipped as salted beef; or they were continued on foot over the Alleghany Mountains to the Atlantic cities, where the larger packing houses were located.

The price of cattle was so low as not to encourage the industry. We have known fairly good steers, weighing ten or twelve hundred pounds, to sell for one cent per pound.

About the year 1850 railroads were extended westward across the Alleghany Mountains into what was then known as the Western country. Facilities for transportation were greatly increased. The price of cattle advanced so as to give the farmer a profit on their production. Herds began to increase in numbers and size. Farther and farther westward railroads were extended.

The demand keeping pace with the supply, cattle continued to increase in number, when, in 1870, we had 15,000,000 head, excluding milch cows. The next sixteen years, from 1870 to 1886, shows that we had more than doubled that number, having at that time 31,275,242 head. Since then we have made no material increase. The number in January, 1897, was only 30,508,408. And we do not believe there can be much increase, unless it be done at the expense of other industries. The Eastern and Middle States are already occupied with the various industries. The vast domains in the Western States, which were used for grazing purposes only, are fast being taken up by actual settlers, who are devoting thousands of acres to the raising of cereals, fruits, etc., necessary to their support.

The large individual ranches are gradually being broken up. As the owners become old, and retire or die, their heirs do not want to care for those large possessions. So they, too, pass into the hands of smaller farmers.

While we have no increase in the number of cattle in the past two years, the population of the United States has steadily increased at the rate of more than one million per year. In the year 1894, the year of our greatest depression, the increase in our population reached nearly one and a half millions. The probability is that this rate of increase in population will continue. And as other industries increase and new ones spring up, the demand for cattle will be greater.

We believe the wheat industry is destined to improve. We have in the past few years built up a considerable trade in flour with China and Japan. Ten years ago the quantity of flour taken by China and Japan was insignificant. In 1896 China took seventy million pounds of our flour and Japan took thirty million pounds. As this trade improves, a large per cent. of the wheat raised in the Northwest which now finds its way down through Milwaukee and Chicago, and is shipped to Europe, will go westward and be shipped from the Pacific coast to the Oriental countries.

The beet sugar industry, we think, is also destined to become quite extensive. We already have a number of beet sugar factories in the United States. New York, Wisconsin, Nebraska, Colorado and California are already engaged in raising sugar beets and manufacturing beet sugar. And reports show that beets raised here in Indiana have a larger per cent. of sugar than those raised in Nebraska or Colorado, those in Nebraska having but 10 to 12 per cent., while those raised in Indiana show 12 to 14 per cent.

While we have no increase in cattle in the past ten years, we are doing an immense business in this industry, as the trade of the present will show. I hold in my hand a Chicago Daily Journal of yesterday, which gives the receipts at the four points, St. Louis, Kansas City, Omaha and Chicago. The combined receipts at these points on Thursday of this week were 29,000 head. The receipts at Chicago alone for the four first days of this week were 60,000 head. And this, you will understand, is but a fractional part of the entire number sent to market every week.

Although France and Germany are wearing a cloak of retaliation, refusing to take our beef, alleging disease as the cause, reports show that we are doing a lively foreign trade. In the fiscal year ending June 30, 1896, we exported: Live cattle, 372,461 head; beef canned, 5,636,953 pounds; dressed fresh beef, 18,974,107 pounds; beef salted, 3,975,113 pounds.

It seems to us that in a few years more we will not want foreigners to take our beef, for it will all be wanted at home. The question may arise, if the population continues to increase and we make no increase in cattle, how is the demand to be supplied.

We will learn to do as we are doing with the pig. We no longer raise hogs and then fatten them, but we grow pork. So we will not raise cattle and then fatten them, but we will grow beef. Instead of sending our steers to market at three or three and a half years old, weighing from twelve to fourteen hundred, we will send them at two to two and a half years old, making them weigh about the same number of pounds. Thus supplying the market with one-third less number of cattle.

We have been engaged in the cattle industry for thirty-three years, and at no time during that period have we sold good steers at a loss on their production. The highest price we ever received was in the year 1866, when we sold at seven and a quarter cents per pound. The lowest was in August, 1894. That year we sold some steers at three and a half cents per pound. And even these steers at two and a half years old gave us a small profit, bringing $43 per head. This was in a year of our greatest depression in business. And we wish to say the cattle industry did not suffer more than other industries. Had not the laboring men been deprived of means to buy, beef would have sold at good prices. Now in the year 1897, when business has revived and the laboring men are again employed, the shortage in the supply of beef cattle is felt. Butchers everywhere tell us cattle are scarce and hard to buy. The demand exceeds the supply.

Gentlemen, with these facts before your minds, you can judge the future of the cattle industry as well as we can.

While we believe the future looks bright, we cannot expect fabulous prices, from the fact, whenever prices go above a certain point the great mass of people will use less by substituting something else. By doing this they will reduce the demand until the price again falls within their reach.

SHEEP.

BY ANNIE FARR CRONE, WEST LEBANON.

[Read before the Warren County Farmers' Institute.]

We are on the threshold of an unexampled era of prosperity in the sheep industry. Never in the country's history have the prospects been so bright for the sheepman as at present. The wool side of sheep husbandry is too frequently passed over with indifference by farmers in these days.

It will have its fluctuations, like the weather and a woman's temper, some of you may say, but it is still a good thing.

Wool has been on the under side in the fight for so long that mutton has been allowed to obscure its importance to the sheep farmer.

The new wool tariff, the inadequacy of the present clips, the unusually large demand for woolens, the prosperity of the people and the steady growth of the nation are all factors contributing toward higher prices for wool and a larger wool consumption in the nation.

With regard to mutton as a food, more mutton and less pork should be used, and in time—and not a very long time—its beneficial effects would be manifested in the improved general health of the people. It is very digestible, highly nutritious, has few equals and no superiors.

There is no other product of the farm that has fluctuated so slightly in value as good mutton. There is no stock that can be handled by women so successfully as sheep. She can care for a flock with very little assitance from anyone. And, indeed, I am of the opinion she will have better success with the lambs than a man.

The lambs require attention frequently until several days old. It may appear brisk and strong and apparently need no extra care, and yet die shortly, simply because it received no nourishment, caused either by the dam failing to furnish the required nourishment or the lamb's inability to find it.

We have had lambs that to all appearance were dying taken to a fire, and by a brisk rubbing with a warm cloth and forcing down a small quantity of slightly warmed milk, show signs of improvement, and with frequent attention shortly get up and shake itself, which is always considered a good indication that it will live.

Sheep do better when treated kindly and are not frightened. The shepherd should be of a quiet and gentle turn, and that is one reason women make good flock masters—she is the gentler sex.

Don't turn a flock of sheep into a woods or piece of new ground and expect them to grub it, eat small trees down, all the hazel brush and briers; in short, don't expect them to clear a piece of ground in one season, then because they don't do it, condemn them. They were not intended to do that. While they will do a vast amount of trimming and sprouting, they cannot thrive just on brush any better than your milch cows.

The best scythe you can procure for the weeds in your lots or fence rows is a flock of sheep, as they eat almost any of those obnoxious pests, except mullen or thistle.

Don't turn your flock into a burr patch. Of course they will gather all the burrs, but how much wiser and more profitable it would be to gather the burrs yourself. Burry wool will sell for about 5 cents on the pound less than clean wool.

Some persons have the idea that sheep can subsist for days without water. Not being a filthy animal, it is no indifferent item to keep the troughs and racks free of dirt.

Arrange the winter quarters so that the sheep can be allowed to run out every day the weather will permit.

Have them shedded in stormy or rainy winter weather, as a wet sheep remains cold and damp long after the horse or steer is dry.

A change of pasture is very beneficial, as long confinement to one lot tends to produce disease, and when a sheep gets puny there is little chance of recovery—they haven't the ambition, but soon give up and die.

We find the greatest art in sheep breeding is in selection.

While we have learned that selection is a powerful agent in sheep breeding, we find other things necessary for general success.

The next important feature in breeding of sheep is the feeding thereof--in other words, the old saying often proves true, "The most of the breeding goes down the throat." However perfectly you breed, however pure, however shapely your sheep, you must have the animals properly fed to show the handsome form and grow the most wool.

What a lot of defects splendid condition covers! How much longer and more wool does good and perfect condition grow!

Climate is also an important matter. There are breeds of sheep which in one climate thrive well without any special attention, and in another climate droop and drag out a miserable existence.

We can make the fleece pay the keeping of the sheep, and from these calculations it would leave the lambs and manure for his profit. By comparison we can say wool costs nothing, for do not the horse and cow in shedding their coats waste what the sheep save?

Give the sheep plenty of bedding between December 1 and May 1, and they will produce abundance of fine manure out of it, their manure being far more valuable than that of the horse or cow.

Summing up the many advantages of sheep, we can give them briefly as follows:

Sheep are profitable.

They add to the fertility of the farm—weaken the soil least and strengthen it most.

They clean up rough land—are enemies of weeds.

They are the quietest and easiest handled of all farm stock—earn their own living, and if given the opportunity will feed themselves.

The care they need is required when other farm operations are slack.

The amount of investment need not be large.

Other farm products are made more largely from cash grains, while those from sheep are made principally from pasture. The returns are quick and many, yielding three crops every year—lambs, wool, mutton. In conclusion, I will say, sheep pay and pay well.

THE GENERAL MANAGEMENT OF SWINE.

BY LUCIEN ARBUCKLE, HOPE.

[Read before the Bartholomew County Farmers' Institute.]

The subject assigned to me is one upon which much has been said and written, and every paper pertaining to farm or stock news gives different methods of caring for swine and, for that matter, all our live stock.

There is no special plan which the farmer or breeder must follow, and I would say right here study the business and feed and care for your hogs to the best of your judgment.

Were we to follow the different methods laid out by the stock papers, we would do little else, and in the end be no better off than if we had used our own judgment. Once in a while by following some experienced breeder's advice (for we are never too old to learn) we profit thereby.

But now I will come to my subject and endeavor to give to the best of my ability briefly my plan of caring for swine. Whether or not I have been successful is not for me to say, or whether or not any will follow and profit by my experience I know not.

We will start with the care of the male, being first and the best half of the herd. He should be kept in a good sized lot as large as possible; should be kept in ordinary flesh, neither too fat nor too poor; avoid either extreme; but if you go to either choose the first named. His feed should be varied; in summer he should be kept in a grass lot with plenty of shade and always have pure water to drink; should be fed on slops made of bran shorts, ground corn and oats, or, in short, use your best judgment as to the slop ration, either the first named or the last, or better, all the materials mixed make the best slop, for one may contain what others are lacking in. Feed very little corn, especially in the hot months.

Next comes the brood sows. Feed them sufficient during the breeding season to keep them going, and leave them thin enough in the fall so they will not get too fat during the winter. After they have weaned their litters, a woods with a run on clover and plenty of good, pure water is sufficient for them until the coming of the breeding season.

The pigs when from three to four weeks old should be fed apart from the sow, commencing with a very little new milk, increasing the amount as the pigs grow older, adding shorts and bran, and feed about all the soaked corn they will eat twice a day. This new milk ration may seem extravagant to some, but skim milk is a good substitute if you do not wish to use new milk.

Some wean the little fellows when from six to eight weeks old. I prefer to let them run with the sow, and by properly feeding will wean themselves at from eleven to twelve weeks old. This way the change is gradual and leaves the litters more even in size. At from three to four months old they should be separated and culled. Those intended for the market may now gradually be put on full feed, principally corn, but should be slopped at least once a day. Those intended for breeders should be fed mainly on slop made of any ground feed mixed with what milk and other slops come from the kitchen, and just enough corn to keep them in good plump condition. Some fellows say, "Oh, you keep your pigs too fat." Well, nine out of every ten buy the fattest pig in the bunch.

We should be very careful as to the sanitary care of our herds. Keep them free from lice. Keep good comfortable shelters, plenty of salt, charcoal and ashes, with an occasional feed of some good medicine as a preventative. By this plan we may not cure them of disease, but may prevent them from taking it.

After all, the methods of caring for swine by either the farmer or breeder are practically the same; we all aim to get the greatest profit in the shortest time.

If we succeed, well and good. If we fail, there is something wrong with ourselves. For hogs, if properly cared for, are the best paying animal on the farm, and for the past six or seven years the only one, and bid fair to be a profitable investment for some years to come.

MANAGEMENT AND VALUE OF FARM POULTRY.

BY MRS. CHARLES ROYER, LAGRANGE.

[Read before the Lagrange County Farmers' Institute.]

It is only within a few years that the public at large have become awakened to the importance of the poultry interests of the country. Formerly it was supposed to be of insignificant proportions compared to the beef and pork product. But recent statistics show that the poultry interests in magnitude not only exceed either of the above, but are vastly on the increase, year by year. Yet, strange to say, the supply, enormous as it is, does not keep pace with the demand. As a natural consequence, we are obliged to import millions of dozens of eggs from Europe and carloads of poultry of all descriptions from Canada. December 21, 1888, a train of twenty refrigerator cars loaded with dressed poultry, aggregating 200 tons, arrived in Boston from Canada—$50,000 at one shipment. Think of it. Still the demand goes on.

Our large cities, which form the principal market for poultry and eggs, are growing larger every year. The rich men who inhabit them are growing richer and more numerous, and are always ready to pay the poulterer a good round price for a first-class article.

Good poultry has not only become an everyday necessity to the well-to-do classes, but is a common article of diet, at least, six months of the year, on the workingman's table.

It is everywhere recognized by physicians as the best and most palatable as well as the most wholesome and nutritious of all our flesh diets.

Poultry culture now assumes a most important business of itself. In the management and value of farm poultry three things are essential to make it pay: First, good stock: second, a proper place for it, and third, care.

Good stock in poultry is just as essential as in any other line of live stock. If we cannot afford to have thoroughbred fowls, we should at least have good grades, as the stock men say.

CHICKENS.

What most farmers want is the kind of poultry that will bring in the largest receipts, with the least labor. For the all-round purpose fowls, we believe that the Plymouth Rock chickens, Pekin ducks, mammoth bronze turkeys and Toulouse geese are the most profitable for the farmer's purpose. The Plymouth Rocks are not only beautiful birds of plumage, but they are hardy, good layers, excellent sitters and brooders, and their fine, round, yellow, plump bodies are ready for market from the time they weigh 1½ pounds until maturity. The poulterers tell us that they prefer buying them, as they will always go into the great markets as gilt edge products.

As layers they are only excelled by the Leghorn family, which will lay 160 eggs each in a single season, while their sisters, the Plymouth Rocks, will lay only 150 each. To be sure, if you keep you hens simply for egg production the Leghorn family would be the most profitable, but as we said, the farmer or farmer's wife wants their biddies to act the double purpose of mothers, layers and incubators, and as such they stand second to none. They are for the most part of a gentle and kind disposition and can be moved from one place to another.

GEESE.

The best and most profitable geese to breed are the Toulouse. They originated at a city of that name, on the Garonne River in the south of France. They are extra large, weighing when fattened and matured at three years old, 45, 50 and in some cases even 60 pounds per pair. These geese lay from 25 to 40 eggs, and seldom offer to sit. Toulouse geese live to be very old; some breeders report them living and doing well at the age of thirty years. If they have plenty of grass during the summer, they do not require any grain, and are very small feeders in winter. The feathers are very profitable. They may be picked four times during the summer and each will average from one to two pounds of feathers. These will bring from 50 to 65 cents per pound in the home market.

The young are easy to raise and if let run with the old birds they need very little care. We have had young goslings that never ate anything but grass until six weeks old. They grow so rapidly that at eight weeks old they will weigh from 6 to 8 pounds, and the thoroughbreds, it is said, will at three months weigh from 15 to 18 pounds. The goslings should always be housed during rainy, damp and chilly weather until feathered. They are very susceptible to cold and wet until after this period and many times never recover from its effects. They need only water enough to supply their thirst.

TURKEYS.

In all branches of poultry culture, raising turkeys is perhaps one of the most interesting. The turkey has conquered America; it stands to-day unrivaled in popularity and marketable value. It is not only handsome, but has been bred to remarkable weights, the adult male birds weighing from 35 to 45 pounds and females from 20 to 30. To get the most profit out of them they should have free range. They grow rapidly and take on flesh readily, and being gentle and docile in disposition are easily controlled and brought to maturity. We believe it is best to let the mother bird care for her own brood, and as we have said, have free range of the farm. To be sure, they are great foragers and sometimes make a mistake and get over in our neighbors' fields, yet we can control them by fences and also by feeding every evening. They soon learn to come home for the evening meal.

They are not only profitable within themselves, but of great benefit to other farm products, in the way of destroying bugs, hoppers, etc., which if not destroyed in some way would soon be detrimental to the farmer. Then, we feel we are doing something when we take a downy little poult, weighing only a few ounces, and by our care and attention raise him up to a big strong bird that will weigh from 20 to 30 pounds if the offspring of thoroughbreds. Unless quite experienced in raising turkeys by hand, we think, more lose than gain by the experiment. But they are easily enough raised in that way if we treat them properly.

During incubation, where the hens hatch them, the ground is the best nest to place the eggs in, but if in boxes put three or four inches of dirt in the bottom under the litter, which sprinkle with sulphur or smoking tobacco—you see tobacco has some good qualities.

When hatched they should not be fed for 24 to 36 hours. Then feed hard boiled eggs, milk curd, egg custard, egg shells, bone meal and plenty of grit. In addition give them chopped or cracked grains when old enough to eat it.

Watch the flock for lice. Do not watch as we have heard of some doing; that is, by looking for them under the wing, instead of under the feathers on the upper edge of the wing. If lice are found, melt some lard and add an equal quantity of kerosene oil, touch the wings and top of the head with the mixture. Three or four applications is generally sufficient. If the turkeys get droopy give them a pill of lard and black pepper. They should always be kept in a dry place during damp and windy weather. But when the weather is favorable keep among the grass, changing as often as they become foul. When they get pretty well feathered they will do well with plenty of whole grain, grit and water, plenty of range, and a roost with the sky for a roof.

DUCKS.

The Pekin duck, which is last in this paper, is far from being least in the place with other poultry and products.

Duck culture now assumes a most important part in the poultry business, and yet, until a few years ago, people did not think ducks were fit to eat. But now the public appetite is fast becoming educated to the fact that a nice, crisp, roasted duck is not only a dish fit for an epicure, but is on a par with either turkey, chicken or goose. As a natural consequence, the demand for good ducks is rapidly increasing, and right here is an opening for the farmer and his wife to make their farm produce of greater value. One great advantage with ducks is, you can and should keep them confined in pens and yards until half grown or fully matured. A hen when closely confined loses her ambition and spends a large part of her time in the perches, apparently oblivious of all other things. Not so your duck. She is in constant motion; no matter how small her quarters, she is never quiet.

The duck, unlike the hen, is best suited for our cold, winter climate. She is well clothed with feathers and down, and when it is thawing loves a snow-bank if she can only work it up in color and consistency of mud. She is like the ten-year-old school boy—does not mind the cold if her feet keep warm. Cold feet affects the winter laying of ducks the same as a frozen comb affects a hen. They are great layers when fed properly, and will lay 140 eggs each, and some 160, and the eggs are large and of good quality and bring in the city markets from 5 to 10 cents more per dozen than hen eggs. One thing that depreciates the value of ducks to the farmer is because he does not understand treating them. They should be fed very little whole grain. To feed for laying this is a good ration: Equal parts wheat bran and corn meal. and one-fifth oat meal, also plenty of grass or vegetables with plenty of grit. Ducks only need water enough to drink, and will do just as well if not better with just enough. The young ducks should never be allowed to swim until they have their breast feathers at least. They must also have plenty of shade when young or the hot sun will kill them.

Never feed the young ducks on corn alone; it is a too highly concentrated food. A mash composed largely of wheat bran and oat meal, and one-fifth corn meal, with plenty of green food, and some animal food and one-fifth coarse sand is a fine diet after they are one week old. They do not get as many diseases as other lines of poultry.

The Pekin has only two faults, their extreme timidity and loud voices. When ready to fatten they should be yarded, where they have had free range, and on dark nights lanterns hung so they can see each other. If one gets frightened it will make a quick move and its wings, etc., will touch two or three more and they will be frightened, and so on until the whole flock are going round and round, and this they will keep up all night long. This takes off the fat and we are the losers.

CARE OF POULTRY.

In regard to care we should at least have one good house or shed for each kind of poultry kept. So many farmers and their wives get discouraged in trying to raise poultry just because they do not read up on the subject. They go at it blindfolded.

The hennery should be the best building of its size on the farm. It should be rat proof, and as near lice proof as man can make it. We believe if every hennery was lathed and plastered, and given two or three coats of lime whitewash made strong with 95 per cent. pure carbolic acid, and have loose nest boxes and perches, this would almost be lice proof. The floor should be renewed with good gravel once or twice a year, and a good dust box provided. The nests should be from four to six inches deep with dirt in the bottom and a tablespoonful of sulphur mixed in. On this should be placed chaff or hay—we do not use straw. The sparrows roost in the stacks and are the first mite producers; therefore we think the straw is often full of nits and mites, perhaps. The time to watch for these troublesome pests is when the hen is sitting, especially the last week of incubation. If the hen looks pale examine her, or if you see a stray louse running over the eggs, change the litter and clean the nests thoroughly or you may lose hen and all.

Never set your hens in the laying room, but at dusk move hen and nest to some safe place where she will be unmolested. Always count forward to when the eggs will hatch and put that date on the eggs. Watch your hens and if any eggs are broken wash carefully in warm water all soiled ones. It is a good plan to shut hens in their nests and just let them out once a day to feed, water and have a dust bath; this usually satisfies them. Always burn all nest litter and nests, too, if badly infested. Another important factor in the care of poultry is feeding it; this and the sanitary condition of yards and houses is the secret which keeps off all diseases.

Birds kept for egg production or breeders should not be kept too fat. It has been the custom of many to feed poultry almost wholly upon corn, summer and winter, but as in other things great improvement has been made. It has been found as necessary to give variety of food to fowls as to persons or other domestic animals. If you want them to do their best, feed corn, buckwheat, oats, wheat, cooked vegetables of all varieties, meat, raw or cooked, or its substitute, fruit, refuse from the table, raw cabbage in winter as a substitute for the tender grasses they obtain through the spring and summer. Hay and dried grasses, cut fine, or clover chaff from the barn floor is relished by them. Throw noon ration of wheat grain onto this and let them scratch for it. In the morning they should have a warm mash and in cold weather plenty of warm water. At night it is well to give them some corn, as it keeps up the animal heat of the fowls while they are quiet. As a usual thing there is more or less mortality among young fowls. They should never be fed anything the first twelve hours. First feed should consist of hard boiled eggs; after a few days stale bread crumbs soaked in milk and also curd or egg and milk custard. This should be fed sparingly and often. After the first week begin to feed boiled potatoes, cooked oat meal, cooked rice or any variety of cooked foods. They are better not fed corn meal until the third or fourth week. This should be cooked. Give cracked corn, oats, wheat, etc., two or three times a week now. A little bone meal, pepper and salt should also be added.

Poultry raising is a healthful and pleasant occupation, for variety, on the farm, and should be more encouraged. Where the wife or daughter raises the poultry, the farmer and son should enter into hearty co-operation with and do everything in their power to make their efforts a success. The full egg basket lightens expenses for the farmer, and in the fall the surplus fowls get nearly all the clothing for wife and children, which is a great boon to the farmer who is heavily in debt, and it also is a luxury to his table.

So, husbands, enter into hearty sympathy with wife and family and help them each year to get a few thoroughbreds, until your flocks are the pride of yourself and your friends. You can then get better prices for your poultry.

POULTRY FOR PLEASURE AND PROFIT.

BY JOHN M. DAVIS, QUERCUS GROVE.

[Read before the Switzerland County Farmers' Institute.]

There is no business that will pay better returns for money and labor expended than the poultry industry. But if we live for and go through life only for the dollars and cents there are in it, we will be paid very scantily in most cases. When, if we were to mix a pleasure in with it occasionally, we would have better returns even as far as dollars and cents are concerned.

Take the business that has no pleasure in it, but is pursued for the profit only, and it seems to be a drudgery and a burden, but when we find pleasure with it, how much its cares are lightened. One of the great items necessary to success with poultry for the beginner is that he should have a love for it. If he has not this qualification he had better stay out of it entirely or he will be pretty sure to make a failure. If he has not interest enough in his birds to study them for other motives than their money-making qualities he will be a long time reaching the topmost round.

In starting procure the best that is within your reach. Better select but one breed and spare no pains to make them the best. You cannot expect to be successful without an outlay of capital and labor. It is an old saying, "That a silk purse cannot be made from a sow's ear."

How is the inexperienced person to know what breed to select after he has determined what course he is going to pursue? A person who does not know the habits and charcteristics of the different breeds is liable to be mistaken in making his choice. If we are to take the catalogue of many of the breeders of poultry, or the numerous articles written for our journals, we will find the admirers of some particular breed have become so enthusiastic in the praise of their favorites that they will claim for them almost every good quality that can be enumerated, and still be sincere in their claims.

But every one should know that all these qualities cannot be combined in any particular breed. Some are better layers, some better mothers, some produce more eggs, some more meat, some will sit better than others, but you must not expect to find all these qualities in any one breed. Nature has set bounds beyond which we cannot pass. But there are some that come nearer being a general purpose fowl than others.

There are sources from which the beginners may get good advice. Books and such literature are to be had for a very small sum, which outlay may prove to be worth many dollars to the beginner.

Poultry must be raised with one or two ends in view, either for eggs or meat. If our aim is to be eggs we must select some of the non-sitting breeds, the Leghorn family being the best of this class.

If your choice is meat for market purpose you should select some of the Asiatic breeds, the best suited for this purpose being the Brahmas and Cochins. If a general purpose breed is desired the Plymouth Rocks will be found to be about the best. Economy must be practiced in poultry as well as anything else.

This refers to time as well as money. We must read and use good common sense in all we do. Paper stories of great egg record tests and such like must not be taken as models by which to go, or you must not be disappointed if you do not equal them. I believe many of them to be overdrawn in some respects. If they are not, you will not be able to equal them without some experience.

You will find they are always from small numbers, and better results may always be had with a small flock.

You cannot always make your business work out as you can figure it out, as there are so many conditions that are not taken into consideration by figures.

Poultry as a business must be conducted on strictly business principles. It must not be carried on in a slip-shod manner, or you will reap accordingly. Standard-bred fowls positively excel in size, vigor and egg production. Take the breeder that is always on the watch and he will sell you eggs from his best breeding pens, but will not sell you his best fowls unless he is going to quit the business. The breeder that sells you his best birds just because he can get a good price for them and keeps the culls from which to breed is the one that tells you that pure bred poultry is not healthy, because in selecting his breeders he has taken what was left, and if they were inferior in other respects they surely are so in health.

What a comfort it is to really produce something fine, and know that it was through your efforts it gained the points of beauty and utility. What a pride we feel in the knowing that we have something fine. The poultryman who does not have this pride I am afraid will not be very successful.

If you are going to breed for eggs select your best laying hens (standard bred) as near perfect in their markings as possible (and here some will claim there is no difference; one hen will produce as many eggs as another, but this is all a mistake). Therefore, select a good laying strain and mate with standard bred males, as like begets like. If you cannot afford a good sized pen buy a pair or trio. But by all means begin with pure stock or cross on your common hens some good males of above strain and see if you will not notice the effect in the egg basket. The frequent advice to feed a variety of food is not simply to gratify the desire or appetite of the fowls, but another purpose.

We find different elements required by the hen to produce bone, eggs, flesh and feathers, and it must be supplied by different foods.

Feed your hogs entirely on corn and see if they will not become very fat and their bones be weak and insufficient to support their weight. We will find this true also with poultry. The food must be of a varied character to supply materials needed. If you are feeding for eggs they must be fed food that will produce best results, wheat, corn, soft food, table scraps, little potatoes, refuse cabbage, meat, ground bone, cut clover and such food as gives best returns, outlay considered.

Judgment should be used in feeding, as you should not get your hens overfat if eggs are your object. Cause your hens to work for their grain foods by scratching for it in the litter on the floor. They must have exercise to keep them from becoming too fat and lazy. After your trouble in feeding you may yet fail to get any eggs if you do not supply grit and lime. This may be done by using crushed shells, broken china, charcoal, etc. And by all means they must have a plentiful supply of fresh water. They should be provided with a dust bath, as this is the hen's toilet; by it she frees herself from vermin, cleans her body and enjoys it.

If you are to raise fowls for market, you must also feed a variety of food, but not necessarily as great a variety, as most of the ration when preparing them for market should be corn. Thoroughbred fowls show their superiority for market purpose as well as laying. But the same rule may be practiced as in the laying strain. Weed out your small hens and cross on the largest a large male of the meat producing strains that have been recommended, and thereby increase the weight of your chicks at least two pounds each. If you raise 400 chicks you will have gained by such breeding 800 pounds, which at 7 cents per pound will give you $56 for your small outlay for large males purchased.

Manage to have your chicks hatched as early as possible. If you have an incubator you have this advantage in that line. Sell what you can for early broilers, and if you are conveniently situated you may make a good thing of the capon business. If you are to follow this branch of the work I know of no other breed better suited to it than the Light Brahmas. Capons should be early hatched. All large breeds do better hatched early, anyhow, whether for capons or not, for they require some time to mature and should be grown, or nearly so, by the time cold weather sets in, in order to make good specimens. Breed as prescribed and see if you are not agreeably surprised by seeing your flock grow better each year. Think this over and you will decide in favor of the standard bred poultry instead of so many misfits among your flock of mongrels. Do not rush into the business at breakneck speed, but advance as you learn. Just because someone else has and is doing well with poultry on a large scale, don't think you can do it. You may, but the chances are you won't till you learn how. Do not try an incubator until you are able to raise chicks the natural way, as it is not an arrangement that any child can manage, as is claimed by many.

In setting your hens give good nests; set good hens and in places where they will not be molested. Use well shaped fertile eggs of medium size and you may count on a good hatch if she has not been given too many eggs. There are various ways and foods that may be employed in rearing chicks and with good results. But they must be given good quarters, the coops must be dry, warm and vermin proof.

Not one-half generally of the chicks that are hatched on the farm ever live to maturity, yet they cannot be accounted for. One great loss is from poor quarters. Nothing is so discouraging as to have a lot of chicks standing around in cold, rainy weather, the old coops all wet and chicks cheeping that plaintive cheep so familiar at such a time.

Do not put off making coops till they are needed, for you will be busy planting potatoes or plowing for corn and will tell your wife to put them in that old box till you get time to make a coop, and you never get time. Make them rainy days when you cannot work out of doors and then when wanted they are ready for use. Get your children interested in poultry and make the farm attractive, and in this way you may be able to keep a larger portion of our boys from the city.

Get the little boy or girl a pair of pigeons or bantams and get them to love the work. I have two little boys, five and two years old, and the oldest is as big a chicken crank as I am, age considered, and I am glad of it. They will go out in the yard with some corn, catch a fowl and carry it around as they do their cats.

Treat your fowls gently and they will always be underfoot.

What we need in every branch of business is more thoroughness, and nowhere will it pay any better than with poultry. Poultry is almost indispensable to the fruit grower. In an orchard they are the best of scavengers, picking up many insects and grubs that are harmful to the fruit. Set plum trees in your poultry yards, as it will afford good shade and also get good returns from ground that would otherwise be lost.

Other than these points poultry will add greatly to the attractiveness of the premises and lawn.

The fertilizer must not be overlooked, as if properly saved and used it will pay for the care of handling and feeding fowls.

These are some, not all, of the requisites necessary to success with poultry, but if these are followed you will be on the road toward success.

RAISING POULTRY.

BY MRS. ETTA HUBER.

[Read before the Steuben County Farmers' Institute.]

The various journals and books devoted to poultry raising usually treat the subject as a high art, involving much expense; and the instructions, plans for buildings and methods employed are largely for the benefit of those who make the business a specialty. My aim is to give only such information, derived from actual experience, as will aid farmers who raise poultry as an auxiliary source of income. The low price of wheat, which has hitherto been the farmer's staple cash product, makes it imperative for him to look well to every source of production on the farm to make up the deficiency. Poultry raising on the farm is different from stock raising. It is a profession in itself; and often the farmer does not devote the care and strict attention to details which the business requires.

For this reason, and because of a more natural fitness for the work, poultry raising on the farm usually devolves upon the women; and we are sorry to say that many of them meet with the biggest discouragements in the farmer himself. It seems impossible for some to understand why it is more profitable to feed corn to poultry than to hogs, when the former brings more than double the latter per pound in market. It requires more corn to produce 100 pounds of pork than of poultry.

If a farmer's wife is successful and becomes thoroughly interested in the work, her husband certainly stands in the way of his own interests when he refuses to provide incubators, brooders and other necessities for enlarging the business and making it more remunerative. In such a case it requires a great deal of grit and determination to succeed.

Poultry raising may be divided into two distinct parts—first, poultry for market; second, poultry for egg production. Raising poultry for market is the most remunerative branch of the industry. Farmers usually aim to supply the fall markets, which is a great mistake. We should have our poultry ready for the early markets, and realize from 10 to 12 cents per pound, instead of from 4 to 5 cents for it. To accomplish this a good incubator is indispensable. After operating a first-class hatcher it will require more than ordinary patience to go back to the old way, and minister to the wants and whims of a lot of sitting hens. Economy can be successfully practiced in almost everything, but a good incubator is a necessity.

After selecting the kind of fowl to be raised, or the best market fowl, preparations should be made to take care of the chicks, as it requires different conveniences to handle a large flock hatched by artificial incubation, from those required when a lot of hens come off with broods. Unless proper preparation has been made, the operator is liable to find herself in a predicament like one of our lady correspondents who wrote: "My first hatch was a surprise. I found myself possessed of over 170 little orphans, and with all the responsibilities of a dozen clucking hens."

A brooder or foster mother of some kind must be had, and a very good one may be provided at very little cost. In fact, my first brooder cost me nothing but the tacks and nails, for I made it myself.

Little coops or buildings should be constructed for each separate hatch. We were lucky enough to have a few organ boxes, which answered the purpose very well. The coops should be about 6x6 feet on the ground, and should be provided with a door that can be tightly closed. The ventilators should be covered with wire netting (wire cloth from an old screen door will do), as a protection against rats and other small animals. The ventilators should be provided with a slide, and be large enough to admit plenty of air, especially on warm nights. It will not do to let them get too warm. Chicks should be confined to the brooder three or four days, until they have become acquainted with their foster mother, and have learned where to go when they need hovering. I have small wire netting pens which I place in front of the door of the brooder, and this affords the little "biddies" all the exercise needed till they are old enough to have full range of the farm. In this pen I throw plenty of fine clover chaff which they love to scratch, and in this chaff I feed oatmeal, crumbs of corn bread, crumbs of cheese made from milk, etc.

Never feed chicks for from 12 to 24 hours after they are hatched. Nature provides food for that length of time, the chick absorbing the yolk of the egg just before it breaks the shell, thus gaining a supply of nutriment. After the chicks are 24 hours old, begin by giving oat meal or rolled oats dry, hard boiled eggs (I use the unfertile eggs that we take out of the incubator) the fifth day, bread crumbs, etc. Feed on a board, with a little sand or grit, which they need, and which nature has taught them to eat. Feed every three hours the first two or three days. It is not necessary to give any meat or green food the first week. At the beginning of the second week feed a little chopped onions at noon. After the second week feed liberally, or all they will eat. Never feed raw meat of any kind. Always bake or scald it, as raw meat will cause bowel trouble, which is almost sure to be fatal. We often mix a little ground charcoal in their food, as it is a good blood purifier. When two weeks old give them full range of the farm; they will return to their brooder at evening. When they have outgrown their brooder, perches should be provided for them in the coops heretofore mentioned. The perches should be about a foot from the ground, and far enough apart to prevent their huddling; but the space should not be wide enough to allow them to fall through. The entire floor should be covered with perches. If space is left, they will huddle, and those underneath will be smothered. When two weeks old, they may have whole wheat and cracked corn, which should be scattered in the litter an hour before sunset, so they can find it before dark. Be sure they go to roost with full crops. Plenty of fresh water should always be provided. A good water fountain, within the reach of all farmers, may be made in this way: Fill a tall gallon jar with water, cover it with a jelly-pan, placing it on bottom side up, then quickly invert the jar and pan,, insert a nail under one edge of the jar, and the pan will always be full of water, making a cheap and good fountain, from which chicks can drink without getting their feet into it. With this kind of care, your chicks will be ready for the early market.

Now as to the raising of good poultry for egg production. The farm where it is "root hog or die," and the faithful cow has to "make milk out of straw," is the place where the hen is expected to make eggs without food, and to "scratch for a living." On every farm, poultry may be kept with profit; not as a specialty, but in connection with general farming. When a farmer has means at his command, it is an easy matter to build suitable poultry houses. But fortunately for those with limited means, "Biddie" is not particular as to outward appearances; and if certain requirements of her nature be provided she will reward her owner quite as generously in more humble quarters. The most essential of these requirements are light, warmth, pure air and dry quarters. Dampness is the worst possible condition for poultry. It produces foul and disagreeable odors, and promotes disease, which, if not fatal to the flock, will impair their vitality and render them unprofitable. When hens have the run of the place, as is usually the case on the farm, the poultry house should be so situated as to afford access to the stacks, sheds and other farm buildings during fair weather. But always protect your hens from cold, and in stormy weather confine them to the poultry house. There they should be supplied with a clover chaff litter, for they love to busy themselves scratching for the small grain which should be thrown in the litter. Some poultry raisers commend leaves gathered in the fall for a litter. We prefer clover chaff, as hens eat a portion of it and profit by it. For the morning meal we often take clean clover chaff, scald it in the evening and mix it with the morning food.

Fowls should not be fed too heavily when eggs are desired. A hen must have a large proportion of albumen in her food if she lays many eggs. Most people feed too much corn, causing them to lay on fat; they can't make many eggs, because they are not getting material to make albumen. And they must have plenty of clean, pure water. Eggs, it is said, are 67 per cent. water, and if they have to melt snow to get water, they won't lay many eggs for you in cold weather. And the hen must have lime to make shell of. Lime in some form is indispensable, and it should be within the reach of fowls at all times. Broken egg shells are excellent, but they should be finely broken, or the hens may be taught to eat eggs. We save the shells taken from incubator in hatching time, and store them away for winter use. Lime water is the most effectual remedy for hens laying soft shelled eggs. One teaspoonful to a pint of water is sufficient.

Hens, when allowed to have full run, pick up with their food the necessary amount of shell-forming material; but when shut up we should endeavor to imitate nature by adding it to their food. And the hen must have grit to grind her food. We keep plenty of gravel, and I break in pieces all the old broken dishes I can find, for sharp grit. When we have "gold standard," I feed gold band dishes. All their wants must be attended to. Supplying all but one will not answer. We feed green cut bone, and think it a splendid and cheap food. It possesses all the elements contained in an egg, and it gives hens a bright, healthy appearance.

I will give my way of feeding for winter laying, which we have found very satisfactory with hens young and healthy to begin with. After the hens have gone to roost in the evening, I scatter a large basket of clover chaff in the coop, and with it enough wheat to encourage exercise in the morning, but do not give enough for a meal by any means. About 9 o'clock I give a warm meal of scalded bran and middlings, with a little salt, also scraps from the table, potato parings, apple parings, scraps of cabbage, etc.; and at the same time I feed green cut bone, which they relish better than any other feed given them. I feed at the rate of one quart of cut bone for each twenty hens. I keep plenty of fresh water before them all the time. About 4 p. m. I feed grain in the litter, so they will have plenty of exercise and time to eat before roosting time. Wheat is best single grain; far better than corn. But hens, like people, relish a change in food. I change from wheat to corn, oats and sunflower seeds, once in a while. My hens get all the buttermilk, which is good for them. With a little care and attention, your hens will liberally supply you with eggs during winter.

POULTRY RAISING FOR PROFIT.

BY MRS. MOLLIE FITZGERRELL, POSEYVILLE.

[Read before the Posey County Farmers' Institute.]

Why farmers do not take more interest in raising poultry is a question that should interest you all. If you would take time to think and reason, and at the same time do away with all prejudice, you will learn that it is profitable to keep pure-bred poultry, from the fact that you can make more clear money for the amount invested than in keeping any other stock. Most farmers can easily be induced to pay a big price for a blooded hog, an Oxford Down sheep or a Holstein cow, but let his wife speak of investing two or three dollars in a setting of fine eggs, or three or four dollars for a bronze turkey, or a good Plymouth Rock rooster, why they will say at once that is an outrage. There seems to be only a small percentage of farmers who know the full value of poultry from the fact that they neglect them so much; and an aimless, slipshod manner of conducting any kind of business is sure to result in failure and disappointment. If farmers could only be induced to improve their fowls as they do their other stock, there would be a big profit in the business, and after they had once reared a flock of pure-bred fowls, all the same color and size, would be just as proud of them as they are of their fine sheep and hogs.

Fancy fowls are only improved fowls, something better than common ones, and when kept for market purposes only they are better than scrub chickens, as they are not only improved in color of plumage and other fine points, but in hardiness, early maturity and egg production. It is a shame that so many nice people will look down on poultry, but I am proud to say that this feeling is not so common as it once was, but far too common yet. If you expect to make poultry keeping profitable you must have a little method in managing your flock. The most important elements of success are as follows: A natural liking for poultry and poultry keeping, the use of nothing but choice stock from a variety that suits your own taste and purpose, suitable conveniences, proper care and management of fowls and chicks, a thorough knowledge of the variety which one is raising, the necessity of exhibiting stock at fairs and poultry shows, provided you are selling stock and eggs at fancy prices, and honorable dealing.

There is more than one way to make the raising of poultry profitable. Many fanciers are making money keeping and raising the very finest fowls to be had and selling them from $1 to as high as $2.50 each, and selling eggs from these fine fowls at from one to ten dollars a setting. When time and money are at command, such extra fancy birds may be well enough, but for the average farmer, one who desires his flock to produce a certain sum at a specfied time regularly, such extra fancy pencilings and markings might, to a certain extent, be ignored with profit, for the gains of such extra fancy dealings are spasmodic rather than regular. Others make a big profit raising broilers for early market. To do this it is necessary that you should have very early sitters. For broilers and a general purpose fowl the Plymouth Rock stands at the top. While they are large fowls, they are most excellent layers and early sitters, if not allowed to get too fat. They fatten easy, feather out nicely when young, and this is the reason they are such nice chicks for broilers. The Plymouth Rock can easily be induced to lay in early winter and be ready to set as early as the months of January and February, and this, I think, is far better than to depend upon incubators and brooders.

In regard to raising poultry on the farm, where only a limited amount of help is usually at command, instead of buying incubators and brooders, invest your money in warm, well-ventilated coops and buildings. Stock your yards up with a flock of well improved hens, and then give them same careful personal attention as you would the incubator and brooders. You will find that your time, labor and expenses will be greatly diminished; the result in hatching and raising far more satisfactory. In January of last year I set six hens on ninety eggs; from these I raised seventy-two chicks for the early market. At ten and twelve weeks old they brought me the neat little sum of 35 cents each, about 25 cents clear for each chick, as the cost of rearing an early broiler is estimated by successful poultrymen to be from 10 to 12 cents each.

The most important work in poultry keeping is the care and management of the hens. To get them in a good laying condition for winter is rather problematical. To do this you should not allow them to work all through the hot summer months. Never allow a hen to hatch off a brood after the last week in May. If they show signs of broodiness, jail them up in a well ventilated coop until this disposition vanishes. This gives the hen three months to rest and recruit herself prior to the moulting season, and also puts her in a more vigorous, healthy condition, so as to tide her through more quickly. After this, if you will clean up your premises, disinfect the buildings with whitewash, thoroughly impregnated with carbolic acid, see that the nest boxes are freed from vermin by the use of coal oil, burn all the old nesting material, replenish with clean bright straw, you will from this time on have well-filled egg baskets and plenty of early sitters, provided you feed and water regularly. Swelled oats dredged in wheat bran is my favorite food for laying hens. Fine coal, together with oyster shell and grit, is excellent. To keep them free from vermin I fumigate and disinfect the buildings with tobacco smoke, sulphur and carbolic acid monthly; and dip the fowls in coal oil emulsion annually. From this method of caring for hens I have been able this season to set fifteen hens this month (January). The next thing of interest is when the chicks come off. They should have a warm, dry coop and careful brooding for twenty-four hours without food or water. After this well and properly fed; not over nor under fed should be the rule. Vermin is the greatest drawback to our poultry, and cleanliness is a good prevention. After young chicks have fallen a victim to them, though, there should be no delay in ridding them of the pests; tobacco smoke and insect powder are the best remedies. I prefer tobacco smoke; as it helps to destroy the gape-worm also.

When perfectly free from insect life, the next thing of importance is to keep them dry and warm. Allowing young chicks to become chilled and damp, their bodies infested with vermin, is sure to bring about diseases that no remedy will eradicate; besides, I have learned that hygienic rules will work better among poultry than specific remedies. Poultry keeping pays and pays well if the fowls are given proper attention and cared for rightly. There can be a big profit realized in keeping chickens and ducks for eggs. Take a flock of Leghorns from a good laying strain, properly fed and comfortably housed in winter, and they will lay fourteen dozen eggs each in twelve months, which at the low price of 10 cents a dozen would be $1.40, about 75 cents clear for each hen. Two dozen eggs at this low price w[illegible] a bushel of corn, and a good case of eggs will bring as much money as a load of corn, while the time, money and labor it requires to produce the corn exceeds that of egg production by far.

A good bronze turkey will bring almost as much money as a hundred pound hog; still there are many farmers who are saying that poultry doesn't pay, and that their expenses are greater than their income. This is due to the fact that they have given less attention and encouragement to poultry raising than any other industry. In concluding this paper, I do not hesitate to say that poultry keeping, according to the amount of capital and labor involved, is beyond question the most profitable branch of agriculture. And what we want or need to-day is a class of individuals who will persist in learning the most profitable way in which to economize labor and prolong the money-making season of the year for the agricultural class, and then is when you will see the chickens, turkeys, ducks and geese come wheeling into recognition and playing an important part in helping to make both ends meet.

POULTRY RAISING.

BY MRS. R. A. HOUK, BINGEN.

[Read before the Allen County Farmers' Institute.]

Before we take up our subject assigned in the program, allow me to read an article that I have here, entitled, "The Hen in Business." You know so many people think that poultry raising is a small business, merely women's work, and if it is, this will give you some idea of what they are doing.

"THE HEN IN BUSINESS."

"Two hundred and ninety million dollars is quite a fortune. There are mighty few men in the world who have that much. Write it out in figures and try to get an idea of the size of it—$290,000,000. This vast amount of money would buy up all the gold and silver taken from our mines in a year, pay for all the wool and sheep produced in the same time, and have enough left over to pay the value of the entire yearly crop of potatoes, rye, barley and buckwheat. And yet this vast sum represents the yearly earnings of the modest, unassuming American hen.

"The receipts from the poultry business in this country last year were over $290,000,000. There are five fowls to every man, woman and child, and they are all busy. The people who raise them make money all the time—bad times with the good. They made $290,000,000 last year. They live well. They have all the necessaries and most of the luxuries of life; they have money to spend for what they want. The families which raise poultry successfully are the families that have money to spend."—(From Farm Poultry.)

Poultry raising, of course, would include all varieties; as ducks, geese, turkeys and chickens. But the leading thought of our talk to-night will be the hen—the American hen, since I believe she is the best to tie to for all the year round. Let us notice. Poultry raising is a profitable industry, and I will show you what has been done during the last year..

Poultry culture is giving $400 yearly to 1,815,000 men, women and children. It is estimated that each family, or average family, consumes, in poultry, meat and eggs, $36 yearly. This alone is an aggregate of $616,000,000; also, that our hotels and restaurants consume $100,000,000 more; that our manufactures consume $8,000,000 worth, and in the way of medicines, $1,500,000—a grand product of $725,000,000. This represents the labor of 1,815,000 people. It is also conceded that the ordinary hen pays at least 100 per cent. over and above what she eats. Thus, those who labor in the field to produce her food get one-half of this $725,000,000, while those who work in the yards as caretakers get the other half, and all are paid $400 each, by the poultry industry. It is a grand income when we come to think of it. And yet, the poultry business, for plain and simple reasons, is to-day only in its infancy. The chief reason for this is that, until four or five years ago, the cost and trouble of raising early chicks in large numbers by the "old hen method" was too great. The profits did not justify the expenditures. Up to a very few years ago the modern improved incubator and brooder did not exist. There were incubators and brooders, it is true, but they were crude, clumsy and, as a rule, unsuccessful. To-day we find artificial poultry-raising reduced to a science. Profitable poultry-raising on a large scale is no longer an experiment; success has been attained in scores of cases. In this business the demand precedes the supply, and as the supply increases, the demand will also increase. Eggs and poultry are as yet a luxury with one-half of this country's population. A decline in prices may be looked for, but during the past five years the demand for broilers has grown faster than the supply, and hence the prices are better now than they were three, five or ten years ago. The American people (the most prosperous people in the world) have splendid appetites, and up to this time only a few have heard of broilers and roasters or developed a taste for them. It will be years before the supply of broilers and roasters will catch up with the growing demand. So the business offers to first comers extraordinary profits. Then the best thing to do is to raise more broilers. There are few farmers who know the value of early chicks. It requires only a glance to show that the profits are in the early chicks; and we cannot procure early chicks with any degree of certainty, or in any considerable number, by the use of hens, owing to human ingenuity not as yet being sufficient to make hens sit until they are inclined to do so. We can compel a hen to lay eggs, but we cannot compel her to sit.

COST OF A CHICK.

Let us notice what a chick costs. The way to get the exact cost of a chick is to weigh the lot. Say you have 100 and they weigh 5 pounds when hatched and double in weight every ten days for the first forty days. (This they will do if they are properly fed and cared for.) After forty days they will not double, but grow very rapidly, and sometimes weigh 2 pounds at ten weeks old. And the cost of feeding those 100 chicks ten weeks is estimated at $10—a high price for grain, especially in the West. So you see that it costs but 10 cents to keep a chick ten weeks, or one cent per chick a week. Where the profit comes in is in selling them at this age, and, if put on the market in April and May, they will bring 50 cents each or 25 cents per pound. Now, I know some of you are saying that this cannot be done, but how do you know that it cannot? Try it and see for yourself.

How many farmers of to-day know what their products cost them? No farmer can expect to be successful with poultry or any other stock unless he knows what he is doing. He may be gaining or losing, according to circumstances. Every farmer and poultry man should keep an exact account of every dollar expended and received. By so doing the hens will show what they have done for every week and month in the year, and the prices will enable one to know what the markets may be for the corresponding period of time the next year. It is much easier to keep an account with hens than with the larger stock, as there are usually early receipts of eggs, which need only be counted and entered on the book, while the food can be measured in bulk and fed out, until it is consumed. If farmers would keep strict account of fowls, they would be surprised at the profits derived, in proportion to the capital invested. There is no better time to begin than just now, when the new year is just beginning. Will you please bear this in mind, farmer friends, and keep a book account of your poultry, at least for this year 1898? The farmer will do well to bear in mind the fact that there are some things that are salable all the year round; that it is the dollars that run the home and farm oftener than the hundreds of dollars, and that he can afford to pay attention to poultry as a business as well as to corn, wheat or hogs.

AS TO BREEDS.

Select the breed you prefer, and, by all means, keep it pure. Crossing breeds is injurious. Nine out of ten farmers who use the pure breeds are ahead. Just as soon as the farmer decides to cross, he begins on the down grade. A crossing destroys the purities of the breeds, and is also of no advantage, since the best breeds are the result of judicious crossing and careful selection. Might as well try to increase the value of gold by adding silver to it as to think that by crossing two good breeds will still make them better. If you have Plymouth Rocks, keep them pure and bred up to the highest standard.

A FEW HINTS AS TO WINTER CARE AND MANAGEMENT.

Provide good, warm houses for winter. The house need not be expensive or magnificent to be comfortable, but have them just as good as you can afford, for it looks well to see a nice fowl house on every farm. See that the hens are fed on a variety of food, if you expect any returns from them in winter. A plentiful supply of vegetables, such as beets, the culled potatoes, apples and any refuse from the kitchen are relished by the hens, and do not forget the charcoal. Keep this before them daily, also pure water is very essential in egg production.

Winter care of hens is not as much of a snap as some people might think, nor is it well suited to the lazy man or woman. It takes grit and plenty of it, too, in order to succeed with hens in winter. The one who is up and out to their fowl house as soon as it is light enough for the fowls to see to eat, with a warm mash for them, and see that they all come off their perch and partake of it, is the one who is on top.

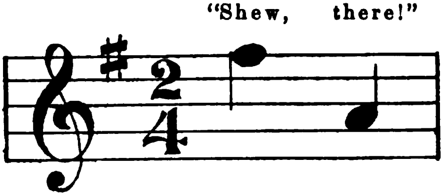
The man has little time to idle away at the village store, sitting around whittling store boxes. Neither has a woman time to peddle gossip, but they must be up and doing, and have an eye to business, or else they will get left.

The question comes to us, why did we import 1,000,000 dozen eggs into the United States last year? What is the matter with the American hen? Nothing is the matter with the American hen, but something is wrong with the American farmer. He needs to be taught the usefulness of raising on his own land a great many things which we are obliged to purchase abroad for lack of domestic supply; and do you know that 130,000 dozen of those eggs came from China? Think of fetching that sort of product all the way from the Flowery Kingdom, when it could have been produced right here at home. But the bulk of those eggs were laid in Canada. While the farmers of Allen County are interesting themselves in the culture of sugar beets, please do not forget to produce more eggs.

THE SEASON'S WORK.

Very soon will Mistress Hen have to be diligent in business, fervent in spirit, serving her owner, but sooner yet will the owner have to be like minded and be up and at it. Let us start with clean houses, nests, roosts and everything all thoroughly whitewashed, free from last season's lice and their eggs, free from all impurities, and as clean as a fresh egg in a new nest. If any fowl should exhibit any kind of disease separate it from the others, find out what is the matter and nurse it to health or kill it. Surgery is heroic at times, but it is business. Better one head off than a whole yard of sick fowls. We realize that as we sow so also shall we reap. We are in business for business purposes and must conduct it on business principles or fail, and there is no time more fitting to fully realize this than at the beginning of a new season. Let us take a fresh start and be guided by past experience, be it our own experience or that of others. Experience is a good school but sometimes a very expensive one. Fumigation and brushing roosts, nests and walls with kerosene is always in order. It is a motion for the lice and mites to adjourn their operations sine die. Once a month is not too often for it. It is natural for our fowls to enjoy good health and to multiply, and should any disease be found in the flock it is not their fault, but the owner's. Disease is not a monster that roams the earth seeking whom it may devour any more than is fire, but an accident of our own courting and breeding. It is brought on by our own neglect and filth. Damp ventilation, improper food, lack of gravel, injudicious feed and the like bring about disease.

Utilize the orchard for poultry. Any farmer who has an orchard and does not keep a flock of fowls upon it is wasting valuable space which could be profitably utilized with advantage. Not that the trees make handy roosting places for the hens but that the orchard makes a splendid run for the fowls. It is also beneficial to the orchard to keep a flock on the ground by the large number of injurious insects which are destroyed. By all means provide runs for the fowls so that they can be confined when necessary. You know a hen is much like a fire-brand—a very fine thing in the right place. Like the "harpies" of old, they are sure to defile all they do not destroy. But with proper conveniences for managing them they are among the most agreeable, profitable and useful objects in country life. To children, especially, fowls are objects of interest and form an almost necessary part of the means of developing the moral and industrial energies of a country household. See the little boy coming along with his cap full of eggs for mama, or patting his favorite hen on its back. Why, there is a whole "California" in the little fellow's heart. He who would educate a boy in the country without a chicken is already a semi-barbarian, and he who leaves his chickens to make a hen-roost—of all things sacred and profane, visible and invisible—is still worse, to say nothing of the good wife's flower garden, the very mention of which excites no small fear of a shower of broomsticks and brickbats, while the whole welkin rings again with the discordant—



POULTRY RAISING.

BY L. C. HOSS, KOKOMO.

[Read before the Howard County Farmers' Institute.]

It is the aggregation of little things that continually surprises us with big results. The five and ten cent transactions often show not only greater profits but larger total business than other things that are set down by the careless observer as of vastly more importance. To this class poultry raising belongs. Frequently it is most heartily condemned as an unprofitable part of farm operations—a kind of necessary evil as it were—by the very persons who are making a better per cent. off of their poultry, more clear money, in fact, than off of any other single feature in their farm work. This feeling, to a great extent, is fostered by the fact that so large a part of the returns from the average farm flock is consumed upon the home table in the shape of fresh eggs, (a luxury many city people seldom know) and fried, stewed and roast chickens, generally the choicest of the flock, and surely in perfect health and vigor and worth the top of the market, and of all this no account is kept, and as no cash returns are made the true value is never known and finally is lost sight of entirely. Besides, what is really sold is usually in the small and the aggregate is never known. But with the increased facilities now furnished by the State and National governments for accumulating statistics in every branch of industry, it is becoming more and more apparent that the old hen is holding her own with the biggest things out o' doors. Those of you who are inclined to regard poultry raising as a small business, if any such be here, just think of the "pesky" hens of this country as doing $290-000,000 worth of business in a single year (and still our supply is short of the demand and the imports run into the millions). It seems beyond belief, yet that is according to government reports, and more than that, no other single branch of agricultural industry comes within many millions of her. Even the best of the farm's big money makers fail to get close enough to turn up its aristocratic nose at her and cry "Shoo!"

Now this gigantic business is the mere adding together of the small and insignificant products of your farms and of the village and city back lots, all the country over. The big poultry raisers, with their enormous plants, turning out chicks and ducklings by the thousand during their hatching season, are but a drop in the bucket of this vast industry. The great bulk of the poultry product of the country is supplied by just such people as we here to-day, who raise poultry merely as a side issue. What we want to realize is this, that without going into the business on a big scale where the chances of loss equal the probability of success, we can add a handsome amount each year to our receipts from poultry by following the suggestion contained in the motto of one of the best poultry publications in the country—"Better poultry and more of it." Of poultry farming as an exclusive business, I shall say little, for I am sure I know but little; but this much I do know, that unless you have proven yourself capable of caring successfully for a large number of fowls in small space, you had better go slow and get more experience before putting good money into it. The difference between the profits realized by an amateur and the profits he had figured out beforehand on his first year's business would be amply sufficient to start several of us in good shape. But the farmer who chooses to add a little to his yearly income by raising "better poultry and more of it" runs almost no risk of loss. To the poultry raiser on this line there are two distinct branches of the business open—to supply market poultry or eggs, or both, and to breed fancy poultry, putting off the culls only to the market.

To produce more and better poultry than is commonly met with on our farms, our first attention should be to the housing. This should be as cheap as possible to give comfort—warmth in winter, coolness and good ventilation in the summer, light and cheerfulness at all seasons. Avoid architectural display. It is a waste of money that could better be spent in improving the stock. While it is unwise to attempt to crowd large numbers together, yet a small house may be made to do the work of a large one if suitable quarters are provided where on cold or stormy days the hens may be made to scratch for their feed and thus take the exercise that they are glad to take in pleasant weather. Anything that will serve as a wind break and keep off snow and rain will answer this purpose admirably. For the past two years I have used sheds constructed of fodder and found them satisfactory. By this means you can have your hens at work every day in the year and the result is that you can sell eggs when there is a profit that is really interesting. But remember that your frozen-combed, frozen-footed or lazy hens lay no eggs. Keep them warm and keep them rustling. The "rustlers" are the winter profit makers and the only ones you can afford to carry over the winter. In this the farmer has a great advantage over the "back-lot" poultryman. With the latter it is a constant struggle to keep his fowls at work and prevent their getting over fat, while the farmer needs look after his flock in this respect only during the inclement weather of winter and spring. The remainder of the year they will almost keep themselves off of the waste and noxious insects picked up here and there.

In the matter of cleaning your poultry houses, treat the hens just as you do your other stock. A mop and scrub brush are not necessary to keep your stables or pig pens in good shape, neither is it necessary to make life a burden in looking after your poultry house. But to keep your flock in health it should not be allowed to go until the escaping gas becomes very noticeable on entering the building. Besides, you can not well afford the loss of the most valuable fertilizer on the farm. Get it out and scatter at once; don't pile but scatter right where you want it, and you will be twice paid for your labor—first by the hens, and second by the increased productiveness of the soil.

But there is a time in the poultry business when life becomes a serious problem, and not only you but your chicks begin to wonder if it is really worth the living. To your chagrin many of them decide it isn't. All this happens likely before you know what the trouble is and right while you are ready to make oath that there is not a louse on your place. But there is and so are his "cousins and his sisters and his aunts." It is a mighty safe plan to follow that when your poultry—old or young—is not doing well to treat them for lice. Nine-tenths of all the poultry disease in the country is caused by lice. Common kerosene is one of the best and cheapest remedies but is entirely too severe to be used on young chicks and is difficult to apply to old ones. What one wants is a wholesale method, not individual treatment. The best thing I have gotten in this line is Lee's Lice Killer. It is used as a paint and is applied to the roost poles and wherever it may be needed, but should be applied to floor or dropping boards immediately under the fowls. Its pungent odor will get his louseship as effectually as the touch of coal oil. A brood of young chicks can be rid of lice by painting the bottom of a box with the lice killer and placing the hen and her brood in it for about an hour. Do not leave them too long in the closed box or the chicks may also yield to the penetrating fumes and go off with the lice. A little thoughtful care along this line will give big returns. Free your chickens from lice and keep them free and you will get more eggs, a greater per cent. of fertile eggs in hatching season, and much less mortality among young chickens and almost entire absence of disease among old. Should you neglect this matter and cholera, so-called, suddenly breaks out in your flock, take my word for it that they need treatment externally and not internally. Go after the lice you don't see just the same as if you saw them and clean up and disinfect and you will find in nearly every case that no meidcine is required. It is well to remember in this connection that at a remarkably tender age a louse becomes a grandmother and the few that happened to be missed at your last onslaught have at least in part obeyed the scriptural injunction to "go forth and multiply and replenish the earth." They have "multiplied and replenished," now you must see to it that they "go forth."

The next important item in poultry raising is to have good stock. Get your ideal chicken and stick to it. One variety is enough. If you wish to make a specialty of eggs, select one of the great egg producing breeds and do not fail to keep your best layers for your breeding stock. If market poultry be your preference select one of the great flesh makers and do not forget that absolutely the finest of the flock from a market standpoint are the ones to keep out for your breeders. Large size, plump bodies and early maturity is what you now want and you must sacrifice a little profit this year to increase it next. But in my judgment it is well to remember that whatever your desire may be to produce, you will find it more pleasant and profitable to keep one of the standard varieties than to use crosses. By so doing your flock is always a thing of beauty, attractive to every passerby as well as a pleasure to yourself. It costs no more to feed and care for good stock than scrubs, and even in poultry a nice even lot, all of one variety, will find ready sale at a premium when a mongrel lot will go begging for buyers. There is a large and I believe I may safely say an increasing class in our cities, great and small, who always want the best in the market, and who, as a rule, are willing to pay an advance on regular market prices to get it. I know of nothing, unless perhaps it be in fruits, in which it will pay better to cater to the demands of this class than in poultry and eggs. A careful observance of these suggestions will, I believe, give favorable returns that would be a surprise to many who have never appreciated the merits of pure bred poultry.

To my notion the most fascinating and at the same time the most profitable branch of the poultry industry is in breeding fine stock. Some wise man has said, "Leave nothing to what is called luck and you will be what is generally called lucky." In every branch of poultry raising is this true, but more especially is it true of fine stock breeding. Shape, in all the sections, color, size, the plumage in quality and quantity, must all be kept in mind in making the matings if the desired results are to be obtained. No haphazard business goes here or evil results may follow that it will take years to overcome.

You may feel sure that you will not be lucky if you trust to luck in any way. Don't buy your stock or eggs of some "Cheap John" trusting to luck for good results. You will be disappointed if you do. Start with a few birds or eggs as you choose—the best you can buy and do not fear but your flock will increase as rapidly as your knowledge of your birds. Stick to the variety you start with. All the pure breeds when bred in their purity are valuable and by judicious breeding, showing and advertising even the least popular of the varieties can be made profitable, more so than by changing varieties at frequent intervals. I will not enter into a discussion of the merits of the different breeds, for outside of my own chosen variety (which I, of course, think the best on earth) there are so many good ones that I would be sure to overrun the time allotted this subject. But I do wish to urge this much upon your attention: poultry culture, in all its branches, is at present on a rising wave of prosperity. The people are beginning to find out that with the immense consumption of eggs in the arts and sciences, added to their household demand, and the utter failure to supplant Biddy's product by a machine-made article at a cheaper price, the danger of overproduction is a myth. Besides it is possible to produce a pound of live poultry as cheaply as a pound of pork or beef, yet it is seldom that the producer's price is as low as on either of them, and when poultry is put on the market at the same price as other meats there will be an immense increase in its consumption; for it is both more palatable and more healthful. So there is no danger of overproduction. Recent statistics have brought these facts home to the people and I can not but feel that of all times now is the time to get in the poultry procession and enjoy the profitable time that is coming. Especially is it a good time to go into pure bred stock, for when the market poultry industry is flourishing is the time to sell fancy stock at remunerative prices.

Every farmer who has not begun it will find it profitable to begin at once to improve his stock by the purchase of a pure bred male, at least, and perhaps a setting of eggs from which to get stock for next year's breeding. If fancy poultry be your choice, start this spring and be in shape to reap the harvest of the near future. Begin in a small way; but begin. Don't wait until next year or the year after and then grieve about the money you might have made. A verse of doggerel I happened on gets the idea to a dot:

"The lightning-bug is brilliant
But he hasn't any mind,
He blunders through existence
With his headlight on behind.
The measuring worm is wiser;
He is in the race for pelf;
He reaches ahead as far as he can
And then he humps himself."

Reach out for some good stock and then "hump" yourself. It will pay.

THE HOME.

CANNING AND PRESERVATION OF FRUITS.

BY MRS. DR. MARY BRUNER, GREENFIELD.

[Read before the Hancock County Farmers' Institute.]

Fruits have their place among foods. They are not tissue makers as meats are; they would not furnish strength to work on. Neither are they heat producers, as starches, sugars and fats; hence would not keep us warm. We would almost starve to death on fruits alone, that is, most of the juicy fruits that grow in this climate. There is a little food in the apple, and the banana is a true muscle-forming food. But the fruits of which we shall speak largely are the juicy fruits and these we may call appetizers and eliminators. The fruit acids in the blood are converted into salts which act as do the alkalies and salycilates in increasing the oxidation of the worn-out tissues, so that they are ready to be carried out of the system by the skin, kidneys and other emunctories. This carrying out process is just as necessary as the pouring in of food. A deficiency in the quantity and variety of fruits in our diet is responsible for some of our rheumatism, liver and kidney diseases. Much of our sickness might be prevented by a properly regulated diet. Few of us use as much fruit as we should. We ought always to have fruit in some form on the table, jelly, butter, jam or preserves, if not fresh canned fruit.

Of course an exclusive fruit diet is just as bad as an exclusive meat or vegetable one. Man is an omniverous animal and all foods belong to his economy.

That the acids are a necessity in our makeup has been demonstrated time and again by seafarers when far out at sea where fruits could not be had in the devastations of scurvy and other diseases. All modern navies are provided with lemons or limes, a fruit similar to the lemon. These are strong acids and can be kept longer and in smaller bulk than our ordinary fruits. Arctic explorers suffer very much for want of fruit and they are learning to carry canned fruits and eat them frozen.

Granting that acids are a necessity in our economy, how are we to get them the year round. Most of us use a large quantity of pickles, sauerkraut, etc., in the winter season, whereas we should enjoy better the fruits if we had them in sufficient abundance and variety that were well kept. It is quite an item of hygiene to have an abundance of fruit the year round. Also to have such a variety that no one will grow tired of any one kind.

Apples and fall pears which are laid away for winter use should be put in the coolest place that can be found which is above the freezing point. Do not put them in barrels or large boxes; they want ventilation. It is better to build your boxes in tiers and have them shallow, so without much handling you can run over them every week or two and pick out the decaying ones and use for cooking. By thus keeping them clean and ventilated it is surprising how long even the fall apples will keep. The warm spring weather, of course, makes them decay.

The old fashioned way of drying fruits was much better than having none at all, but it so nearly destroys the natural flavor that we say blessings on the man who discovered the art of canning.

In preparing fruit for canning it should be first washed thoroughly to remove all dust or soil. This must be done before paring or pitting. otherwise much juice will be lost.

When your fruit is ready for canning add sufficient water to cook them and bring to a boil, press down the top pieces, that it may all be raised to the boiling point, but do not stir if you want your fruit to maintain its form. Many people cook their fruit in their cans. It looks very nice so, but it takes so much water to cover it that it makes the juice too weak to suit me.

If your fruit is cherries or plums the flavor is better if the seeds are left in or at least some of them are dropped into the bottom of the kettle while they cook. Cherries for sauce are nicer with the pits in if care is taken to select only the perfect ones, seeding all that are doubtful.

When the fruit has thoroughly come to a boil it is set off on a side table and your cans, which have been previously warmed on the stove shelf, are gently filled. We use a fruit funnel, take as many cans as we think it will take to hold our kettleful, then add a dipperful alternately to all the cans. Thus we get our fruit into them rapidly while it is hot and do not break our cans. We are careful that each can is perfectly full, then clean off the tops of our cans, if any juice has got on them, first with a moist cloth, then with one that is perfectly dry. If we are using sealing wax it will not adhere unless the glass is dry. If some of the juice bubbles out after we begin to pour on our wax we must remove the wax, dry it again and pour on the wax. We are careful in the selection of our sealing wax—most of that on the market is too hard and brittle; it crumbles on the least jar of the can. I lost much fruit three years ago from such a wax. Since then I have used only the Zubian wax, which is a red wax put up in half-pound boxes. It costs twice as much as the other, but this is a little item by the side of the difference in fruit. I have not lost a can since using it for two years. I much prefer the sealing-wax can to any other. The Lightning jar is very nice if you buy a new and nice soft rubber each time. But the Mason jar is liable to have a little raised place on each side where the seam is and the lid will not fit tightly over it. Then the edge of the lid gets bent so it does not shut out the air. When I use them, after they are cold, I try again to see if I can tighten them, and I turn them upside down. If any juice runs out I open and use the fruit and set the can aside for something that does not need sealing. Fruit will not keep unless it is air-tight, and some of it unless it is kept in the dark. Some fruits are more affected by the light than others. Pears, tomatoes and strawberries are very much affected by the light; hence are easier kept in tin cans unless they are carefully put away in the dark. So many places I see the canned fruit sitting around on the top of cupboards or in back buildings where it is exposed to the light as well as heat. I do not see how one can keep it thus longer than through the winter. Fruit that loses its color or gets soft is not well kept. It should look and taste just as when canned. A dark cupboard in your cellar is the ideal place. If you have not that get some dry goods boxes, put each kind of fruit in a box to itself; then fill the boxes full of sawdust and cover over with boards. The sawdust not only helps increase the darkness but makes the temperature more even. I have had it kept thus that was just as good at the end of four or five years as at the end of the first year. I do not know that there is any limit to the length of time fruit will keep in a cool, dark place.

In filling our cans we often have more juice than we care to put in; if so, we can make it into jelly or put into bottles and seal with wax. These we can open any time and make into jelly or use in our mince meats. Most of our fruit juices are delicious in our mince meats, and a variety is better than a single kind. Old jellies are not so nice as the new. After I have made what I think will last until warm weather I bottle the rest of my juices and make my jelly fresh or use it otherwise. For instance, the other day I opened a gallon bottle of plum juice, cooked up in it a gallon of apples, run through the colander and made into a very nice plum butter. I had made butter of the plums when I put them up two years ago, but did not want any more jelly then. The apples gave it body and the juice flavor, so I had more than a gallon of plum butter without any use of fruit cans or expense in canning. Large bottles are cheap; you can get them at a drug store for little or nothing and they can be cleaned and scalded long enough to get all the medicine taste and odor out of them.

I know no reason why butters and preserves may not keep a great many years if well put away, but after I have made a year's supply I prefer to put up my fruit unsweetened, and open and make my jams and butters fresh. Then we do not have so large a quantity as to grow tired of it before it is gone. Also the fruit is just as sure to keep as the jam; if it should spoil we have only lost one fruit, not our sugar also. Then fruit-canning does not make such a drain on the pocketbook as when everything is sweetened when canned.

We do not have every kind of fruit each year, so should put up in the fat years enough to last for the lean. I cannot tell that my fruit three and four years old is not as good as the new. I always expect to have two years' fruit in my cellar. For my family I keep a can capacity of at least five hundred quarts. Some years I cannot get as good a variety as others, but I have never let any one kind run out unless it be just before that kind of fruit ripens after I feel sure there will be a good crop. It is decided economy to put up an abundance of any kind of fruit when it is nice and cheap. Also we get a much better variety than if we depended upon each season alone for our fruit supply. For example, last year we had no peaches and they were too high in the market to can, but I suspect we are all still abundantly supplied from the crop of the year before.

This planning so that we may have a great variety is quite an important item. We can change from one kind to another so that we retain our relish for it, and thus we eat much more than if we were held to one variety.

THE ART OF BUTTER MAKING.

BY MRS. ROBT. SCOTT.

[Read before the Switzerland County Farmers' Institute.]

Yes, you may call butter-making an art. It is the application of knowledge. We must know how to convert part of our growing crop into butter. This in turn gives us food and that much-sought-for "the mighty dollar."

In olden times butter was unknown, but milk was an important article of food. They had no dairy utensils as we have now. You would see the shepherd with his skin of milk strapped over his shoulder, which would constitute part of his noon-day meal. Tradition tells us that in some way, we do not remember, the milk was violently shaken and when this vessel was opened butter was discovered. The operation consists in separating the butter granules from the milk. As time advanced they had different methods of obtaining this result. Not many years ago it was thought necessary for the air to circulate freely through the cream, and churns were made accordingly. It is still maintained that air plays a subordinate part, that of souring the milk. You all know the change that milk undergoes during a thunder storm.

Cattle have been so improved in regard to butter qualities that it seems almost unreasonable the yield obtained from a single cow during a year. Some claim a production of over 1,100 pounds, as stated by Prof. Plumb in his lecture on the dairy cow. But if you expect your cow to give good milk and a large quantity of it give her the raw material of which to make it. Rich food and enough of it makes rich milk. Bran produces much milk, but the corn meal and other nutritious food makes the cream and gives the rich color to the butter.

We noticed an article in a paper about a merchant going out among the farmers to buy a good cow. Such a one was obtained and a hundred dollars changed hands. The farmer told him how much milk she gave and how much butter produced in a week. Some time afterward the merchant complained to the farmer that the cow did not come up by half to his recommendations. The farmer replied, "I sold you my cow and told you the exact truth, but I did not sell you my pasture or my grain or my care." Right here is the secret to many. What makes a good cow is an abundance of good food, the best of care and the kindest of treatment from the beginning. We must not expect something from nothing. Some cows are better than others. Select a good one and make her better by feed and care.

As a matter of course, everyone who keeps cows for the purpose of making butter, both for family use and market, desires to obtain the best price possible and the largest amount produced from the milk. Yet through ignorance of correct methods, and, we are sorry to say, through careless and slovenly habits, an inferior quality is made, which put on market with the good reduces the price of the better grade of butter. To make good butter we must have good milk and this comes only from healthy cows fed on good feed, containing no noxious weeds, which give the milk and butter a bad flavor.

The milk should be strained immediately after milking and not allowed to stand in the cow stable any longer than is absolutely necessary. The stable should be kept clean, well ventilated and not crowd the animals too closely; yet it should be warm. Milk buckets should always be made of tin and should be thoroughly washed after using, first with cool, then with hot and well scalded with boiling water. When the milk has been obtained the next operation is separating the cream from the body of the milk. This is done in various ways. The old way practiced by our mothers, and still almost universally practiced in this section of the country is the shallow setting system. The milk is put in pans or crocks. In losing the animal heat the butter fat is set free and rises to the surface. To get the best result the temperature should not go above 60 degrees F. The time to skim is when the milk has soured just enough to thicken in the bottom of the pan. No milk should be taken with the cream; if so, it will sour more rapidly. As good a butter is made by this method as by other ways, but it has its disadvantages. So much surface is exposed to the air it is easily affected by atmospheric changes and will absorb any odor that may come in contact with it. Many farmers provide no place for milk. It is put in a damp, musty cellar with decaying vegetables and becomes tainted with them. Next we have the deep, cold setting, consisting of placing deep cans or jars in cold or ice water. But the creamer is so near like it, and so much superior to it, we will pass this method by.

Far in advance of the old method is the creamer. This or a separator should be used by every land owner that pretends to make a success at farming. To be sure, you need an ice house, or have your creamer placed so a cold stream of water will circulate around the cans. The best creaming is done when the temperature of the water is about 40 degrees. It is claimed by this method that all the cream that can be obtained will be up in ten or twelve hours. This may be so, but it is best to let it set twenty-four hours, as the cream will be thicker at the end of this time. The cans are made of glass or tin. The milk is drawn from the bottom of the cans. A piece of glass is inserted in the tin ones, so the cream can be seen, and this is drawn in the cream jar, which is placed in the lower part of the creamer. From personal experience we find the creamer both labor-saving and gain. The one we speak of has been in constant use for twelve or fourteen years. It keeps the milk in excellent condition for table use. We have had no sour milk, excepting buttermilk, all through the summer. Different size creamers can be purchased to suit the number of cows. But the separator is as far in advance of the creamer as that is ahead of the old-fashioned way, where a sufficient number of cows are kept to justify its use. The cream is separated from the milk as soon as taken from the cow, and the milk is warm and fresh for the calves and pigs. Different sized separators can be obtained. A much more perfect separation can be had by this method than by any other yet discovered. This is shown by the increased amount of butter made when the separator is used and also by the amount of butter fat left in the milk after skimming, as shown by the Babcock milk test.

We now have the cream separated from the milk. The next step is ripening the cream. In shallow settings it is already ripe or partly so. It should be kept cool and stirred at each skimming and, when enough has been collected, is ready to churn when brought to the right temperature. With the creamer the cream is sweet. We place the cream jar in the cabinet of the creamer and it remains there till full. It is then put in a temperature of about 60 degrees for twenty-four or thirty-six hours. As soon as it begins to thicken, if at the proper temperature, it is churned. Never mix sweet cream with sour, for from twelve to sixteen hours before churning, the fresh will not be ripened and the butter will not churn out.

A thermometer is indispensable in butter-making. No person can guess at temperature correctly every time. Cream from the separator is still warm and should be cooled as quickly as possible and then treated as sweet cream.

Now get the churn ready, and we will soon have the butter. It is claimed the best churns are the ones with no inside fixtures and which revolve. It should never be filled more than half full of cream. Before putting in the cream, scald the churn with hot water and rinse with cold water. Have the cream at the right temperature. It is impossible to lay down any exact rule; that will have to be determined by trial by the butter maker. It depends on the cow, on the feed of the cow and on richness of the cream. The colder the churning is done the less butter fat is left in the buttermilk. The ordinary temperature is from 58 to 62 degrees. Do not churn too fast, especially after the butter starts to come. as this will burst the granules and give the butter an oily appearance. The butter should be ready to take from the churn in twenty or thirty minutes. This, too, depends on the cow. In some of the patent churns the milk is drawn off and the butter washed and salted in the churn. But this can not be done in a common churn. The butter should be washed twice with pure, cold water. Some only wash it once and some more than twice. Good, fine salt should be used. It should be salted before the butter hardens, using about an ounce of salt for a pound of butter. The first time it should be worked just enough to mix in the salt. Let it set from three to five hours in a temperature of about 60 degrees; work it again. By this time the salt will be dissolved and the butter will have changed its color by coming in contact with the salt. It should now be worked enough to remove all streaks and mottles caused by unequal salting. Do not overwork it; if so, it will give the butter a greasy appearance. Experience is, here, a good teacher.

White specks are caused by the cream drying on top of the pan or crock and becoming so hard it will not churn into butter. Another cause is when milk is skimmed off with the cream it settles and forms a curd, which will not dissolve but remain in the butter. This can be remedied by straining the cream before churning.

The market demands that the butter should have color; therefore, some persons use butter color in dry weather and in winter time, to give the butter as near as possible the color of grass butter in June. If butter is to be kept any length of time, it should have a little more salt than commonly and packed closely in a vessel which will not give a taste to the butter. After the packing is done, put a thin layer of salt over the top and then cover it. In this way good butter can be kept for several weeks. If you are making butter for market make it to suit your customers.

HOW TO LIGHTEN THE LABOR OF HOUSEKEEPING.

BY MRS. J. H. MILLER, PETTIT.

[Read at a local Farmers' Institute in Tippecanoe County.]

How shall we lighten the labor of housekeeping? has been the subject uppermost in the minds of thinking women from the time of our grandmothers to the present time. How shall we relieve the mother of all the drudgery of household cares, that is undermining the health, shattering the nerves and making the would-be counselor, friend, sympathizing mother (with all the word implies) a creature with nerves unstrung, good looks faded and hope shattered?—to whom the small boy of the family knows better than to say: "Mamma, tie my string."

The question, How, implies a belief that it can be done, but the fact is that it has not been done. We will leave out the help subject as one not to be considered these times (unless sickness prevents the mother from assuming the duties of housekeeping), and proceed at once to the things we think will lighten the labor of housemaking.

There are three things that seem to us to be necessary: Co-operation of the members of the family; inventions for labor saving, and planning and systematizing labor.

Co-operation in the work by the members of the family seems to me to be the first thing to be sought for and brought about. If the husband would see the smile brighten the face of his wife, let him take hold of the churn, washer or attend to a peevish child's wants, or in many little ways help by giving a lift.

The child should be taught to attend to all its wants as young as possible. If it comes to us crying and sleepy, it should be taught its first lesson in love by being made to understand in a loving way that its playthings scattered about the room must be placed in a box or basket fixed for the purpose before the tired little one can expect the haven of rest found only in mamma's arms. The rule of order should be inculcated in the child's mind from infancy to childhood and from childhood to manhood. There should be a place for everything, and the child should understand that no place else will do but the right place. How many weary steps would be saved for mamma if only this rule would be followed by each one of the household. There would be no cry of "Where is my hat or mittens?" no rubbers to be looked for, and child and mamma would not need to be worried over the result of bad habits formed in the child.

Love lightens labor, and the child should be taught many ways to help the parents by strict obedience to their wishes, wherein, by their help and cheerfulness, labor becomes almost play and the love of each is strengthened for the other. There should be no division of labor in a home where love reigns and where mutual advancement in all that is good and noble should be the object of each one. If sickness prevents the father from attending to his duties, the wife should rally her forces and see that nothing is lost by it, and vice versa. The home should be our kingdom and love should be the ruler, to whom we should be willing subjects.

Inventions for Saving Labor.—Many are the inventions for helping in housekeeping. If we compare the ways of our grandmothers or mothers with our ways of housekeeping, we give a sigh of relief and are tempted to be thankful that we did not live fifty or a hundred years ago. With our washing machines that a child can operate, our sewing machines and other inventions and appliances, which will be spoken of more fully by others, our oil stoves, upon which the irons are quickly heated for our big ironing without any unnecessary heat, our refrigerators and creameries to save us those tiresome cellar steps—all these and many more have been added to the list. But I hear someone say: "Do we have all these labor-saving appliances?" and we are led by this question to the next division of the subject—planning and systematizing our labor.

We hope we will not be judged too harshly if we say that half the labor of housekeeping could be avoided by carefully planning our work. First, plan your house so that there is as short a distance as possible between your kitchen, pantry and dining room. These are the rooms in which a woman spends at least one-third of her time, and if not properly planned, the work should be done as soon as possible. In one of the best planned houses I ever had the pleasure of being in, the kitchen, pantry and dining room were all in one. A beautiful hand-painted screen separated the cooking stove, table and pantry (which is in the form of a large cupboard) from the dining room proper. This room is heated by what would have been known in olden times as a fire-place, but bears the name grate, situated about half the distance from one end of the room to the other. By this means the steam and vapor, found in our non-ventilated kitchens, escaped, and the room was supplied with fresh air.

After planning the house to save our steps we should plan our work with the same end in view.

Cooking is the subject which worries the woman of the house more than any other work, but we will stop and consider how much extra work we cause ourselves. Everything that comes to our tables must be of the richest kind. Our families must be fed upon the best of the land, and the result is we spend half our time over the hot stove, preparing food unfit for ourselves or our children. We would have less work, better health, our minds would be improved by more reading and less worry, and happiness would reign supreme if we would learn that these things are not necessary.

Good, substantial food, prepared in a wholesome way, is what we want; not rich pies and cakes and delicacies that would have shocked our grandmothers had they seen their children eating them.

In preparing our clothing we can save much work by making only what we cannot buy as economically. Buy only the best, and by carefulness and a stitch in time we get the best results.

Our children will be just as clean and healthy if the clothing be made plain and good, substantial material is used, such as need not cause us to stand for hours over the ironing board.

We can economize time and strength in all the many things that go to make up the daily routine work of the housekeeper.

ECONOMY OF CLEANLINESS.

BY MRS. P. F. NYE, GOSHEN.

[Read before the Elkhart County Farmers' Institute.]

Josh Billings said, "When you have nothing to say, it's a good time to keep still." I have really nothing to say this afternoon, but finding my name on the program, like Topsy, thought I had to "fess something," but will take up but very little of your time. Indeed, it seems like folly for me to say anything on this subject to the intelligent audience present, for I have no doubt that nearly every home and every farm represented here to-day is a model in every respect. My first thought was, perhaps there is no economy in cleanliness, for my mind at once reverted to a woman I knew many years ago who scrubbed and scoured and who never allowed a fly or a particle of dirt to enter her house, whose husband's boots must remain outside or in the woodhouse, and although an excellent woman, "stretching out her hand to the poor and reaching forth her hand to the needy," and capable of doing much good in the world, in middle age, like the woman in the poem, "Laid down and died and was buried in the dirt."

Another woman once I knew, whose kitchen floor was always white and clean and the balance of her house corresponding, but long before she reached her three score years and ten she became so very tired she was laid away to her long, long rest. Then I thought of the squaw in squallor and filth, who lives toward the century mark, and the question again recurred, Is there economy in cleanliness? But these are extreme cases, and some where there must be a happy medium. We certainly do not wish to go back to barbarism. Our civilization is partly measured by the neatness, cleanliness and comforts and conveniences of our homes. Somewhere and sometime I have read that cleanliness costs nothing, for are not soap and water plentiful and cheap? I hardly think it could have been a woman who penned those lines, certainly not one who had to bend over the washtub every Monday morning or go through the daily routine of a farmer's wife. Costs nothing? Ah, many a woman has sacrificed her life upon the altar of too exalted a standard of cleanliness. There is a great deal of comfort in cleanliness, and the woman who fails to make her home as pleasant and comfortable in every respect for her family as possible falls far short of doing her duty. At the same time, it is of the utmost importance that physiology and hygiene be well understood. While some of robust health and constitutions can disregard the laws of health with impunity, others less favored pay the penalty, and sanitary conditions are neglected at the peril of the inmates of many homes. One of the best men I ever knew was a physician, and physicians inform us that there is economy of cleanliness in our cellars; that there would be fewer "mysterious dispensations of Providence" were no decaying vegetables left to harbor the germs of typhoid fever—for which information we ought to be very grateful, albeit, perhaps just once in a while one in the profession might as well have A. M. (after money) as M. D. affixed to his signature. Indeed, since scientific research has discovered about 560 species of microbes and bacteria, some 40 of which are vicious and revel and multiply in filth, the question of cleanliness and practical disinfection towers to first importance in all our surroundings.

In the economy of nature, she spreads over the earth a covering of white, and the beautiful snow and frosty atmosphere purify and beautify all things. So in the economy of cleanliness, when the balmy breezes of springtime come, every house throughout the land must undergo a thorough cleaning, everything from garret to cellar must be overhauled, and what a sigh of relief when the task is completed and order is again restored, and everyone is fully compensated for the extra exertion. We have many conveniences of which our grandmothers scarcely dreamed. Invention is constantly at work devising something new and beautiful and convenient. Our kitchens are filled with utensils now considered indispensable, which years ago were unthought of. No modern house is considered complete without a bathroom, and vast improvement has been made in architectural arrangements that subserve the ends of promoting convenience and comfort. It has been said that common sense is an uncommon possession. We certainly need an abundant supply, and the woman who "looketh well to the ways of her household" finds ample use for good judgment. There can be no fixed rules to govern any one housekeeper. Each must be a law unto herself. I sometimes think if we would brush the cobwebs from our brains and give more thought to everyday work, we would be able to accomplish more, for there are best ways and many not so good methods in nearly all departments of our work, and whatever our hands find to do, let us do it not only with our might, but in the most skillful and workmanlike manner. It has been said that woman possesses intuition—is quick to see. We learn much by reading, much by observation. I seldom call at a neighbor's house without learning something beneficial.

It is easy enough to picture an ideal farmhouse—sanitary conditions perfect, pleasant surroundings, order and cleanliness within, and there are many of them, but the dreamy ideal cannot always be realized. If all are not perfect, let us judge leniently, for the "gude mon" is too busy with the farm work and the farmer's wife has such a variety of duties to occupy her attention that are not down in books or included in the curriculum of any school.

"But the cellar, the milkroom, the kitchen,
  To bake, and to sweep, and to sew,
From the rising of sun to its setting
  Is the round of her days, never new.

From the kitten that plays on the threshold
  To the harvest hands hungry and brown,
Her thought must be ever unceasing,
  Her care for them never laid down.

When echoes the roll call of honor
  Amid the white ranks of the blest,
And over the heads bowed in answer
  The crown of well doing shall rest.

I seem to see brightest among them
  Where weary the worn hands lie still,
And the farmer's wife rests from her labors,
  Quite idle, asleep on the hill.

A glory like sunlight above her,
  A crown for earth's faithful and true
All jeweled with trials passed over
  And sorrow that only He knew."

There is economy of cleanliness in the atmosphere we breathe. Open the doors and windows and let the pure air permeate our sleeping and living rooms.

In the fine art of manufacturing dairy products, butter, etc., cleanliness is emphatically indispensable.

There is economy of cleanliness in the cornfield. As soon as our corn is planted, start the weeder, keep it in motion every available moment.

Does sunshine follow rain? As soon as the ground will permit, before the weeds have a chance to appear above the ground, start the weeder up and down, north and south, east and west. Some times, but not often in our late history, the rain will continue too long and the weeds will get a start, then try the cultivator—shallow tillage—then again the weeder. Keep ahead of the weeds somehow, and when autumn comes and our corn-cribs are full to overflowing—the contents of which, properly used, means sleek horses, thrifty cattle, heavy porkers, and last, but not least, a profitable and fine-looking flock of sheep, we will find that cleanliness in the cornfield paid exceedingly well.

There is economy of cleanliness in the preparation of the seed bed for wheat—fully demonstrated last autumn. When the time came to sow wheat those terribly hot and dry days came also. Those who had kept the harrow and weeder at work and had a firm seed bed and commenced to sow the 17th of September, when the cool breezes came, were soon rewarded by a tinge of green in their wheat fields, and before winter with a luxuriant growth, while the recently plowed fields where weeds or crops were allowed to grow, were slow to germinate the seeds and at the commencement of winter were making but a poor show toward a paying crop of wheat for 1898.

There is economy in cleanliness in our clover fields. After the wheat is harvested and the weeds have something of a start (for it seems as though the weeds we have always with us) run the mower over the fields, not allowing them to seed or appropriate the supply of fertilizer or moisture needed to make strong clover plants.

To recite in detail the numerous applications of the economy of cleanliness to the various operations incident to farm life—in the home first of all, in garden and fields, in the production of crops, great and small, of fruits small and great, to the care of domestic animals, the horse, noblest of all, the cow best of all, the pig, cleanliest of all, the sheep most profitable of all, the poultry least expensive of all, and to all the surroundings and appointments of the rural home, would extend this paper beyond reasonable length; but best of all, more important than all else, greater than all else, let us see that our characters be pure and clean, that no word of slander pass our lips, that no dishonest dollar finds its way into our purses. Then we can truly say,

> "How busy and happy and proud the life
> The farmer lives, and the farmer's wife."

ECONOMY—FARM AND HOUSEHOLD.

BY MRS. J. M. BLOSS, MUNCIE.

[Read before the Delaware County Farmers' Institute.]

Your committee, the vice-presidents of this institute, I believe who selected the subjects for the various papers to be presented at this meeting, were very liberal in giving me a subject broad enough and deep enough for a dozen volumes. In fact, it covers the wise application to the work of the farm and household, all attained scientific as well as empyric knowledge, hence I shall be pardoned if I only touch now here and now there, some of the points in this broad field.

The original notion of economy was limited to the management of household affairs—reducing the expenditures to that which was wise and necessary. But the term economy has, with the growth of ideas, extended beyond the confines of the household and under the head of political economy considers what is wise and necessary for the nation.

The other end of the "line" economy is parsimony, while frugality is scattered all along between. Economy avoids waste, and applies money, time and mental and physical energies to the best advantage. Frugality cuts off all indulgences, while parsimony is frugality carried to the extreme with covetousness added.

In the discussion of this subject it shall be our purpose to suggest rather than fully discuss the lines in which economy may be applied by showing where and how the waste which exists on the farm and in the household may be avoided.

True economic methods on the farm and in the household will result in—

1. The saving of mental worry and much physical labor.
2. The creation of wealth by preventing waste.
3. The preservation of health to enjoy the wealth secured.

There is no line of business in which so much capital is invested in proportion to the returns as in the farm, viz.:

First, in the value of the land and improvements.

Second, in the value of tools, machinery and live stock.

The products of the farm and the growth of its live stock represents the returns for the year. In this product is represented both the recompense for the labor of the husbandman and the true land rent, and most times after the repairs are made but little of the rent is left. If the Henry George single tax theory was carried into effect, it is possible that the government would not be in a condition to build large navies, support a large land police force nor to flirt with Spain and Japan.

But while capital invested in farm lands is not so profitable as in most other lines of business there is one redeeming feature—it is safe. It is only the machinery, the stock, and the crops that are not safe, and it is to these that the strictest lines of economy must be applied.

Farming, except that of the most rudimentary kind, cannot be carried on successfully and profitably without costly machinery.

In the use of machinery there are two elements of waste, viz.:

First, its exposure for eleven months out of twelve, when not in use, to the rain and sunshine. In this way the machine which cost $150, at the end of five years is ruined, when it ought to have lasted ten.

Second, there is waste in the care of the machine. It requires intelligence of a higher order to handle the machine at work, to prevent unnecessary wear and tear. The purpose of all its parts must be understood in order to keep them properly adjusted. To manage a complicated machine requires a skilled laborer. Hence it is not economy to employ a man for such work because he is cheap. In this age of machine labor, the government recognized the fact that the farm needed skilled employees, and to meet this universal need, the State Agricultural colleges sustained practically under the direction of the general government, requires that for the first year the student give one hour each day, in addition to his literary studies, to work in the wood shop. Here he learns to use tools and how, under a skilled artisan, to make things. The second year is devoted for the same period, to work in the blacksmith shop, and the third year is devoted in a like manner to the repair of all kinds of farm machinery, as well as the management of the steam engine.

These then are the things which the most advanced thinkers believe best fit men for labor on the farm. Do you ask why? The answer is evident—to prevent waste. Hence, economy requires that the farmer have not only a tool house but a work shop both for wood and iron, where all the simpler work of repair can be made. The whole outfit for such a shop need not exceed $50. It would pay for itself the first year, provided the owner knew how to use the tools. Besides this there is a culture in this for the boys and girls on the farm which they can get in no other way. Girls need this as much as boys; there are machines in the home which they must know how to keep in repair.

In the best city public schools it has been found that there is need for industrial training to equip the youth for the exigencies of life's work. A work shop upon the farm would supply the elements of just such training. The man that cannot "make things" goes through life single handed, while he who can is twice double handed.

If proper care were given to the farm machinery, there would be fewer dilapidated machines in the "junk shops" and more money in the bank to the credit of the farmer.

In order to prevent waste it is important to know what ration of food is best fitted to his stock and what hygienic treatment is best to keep them in health. There is waste in overfeeding as well as in underfeeding. Stock when compelled to do so from extreme thirst, and probably from long habit, will drink almost any kind of water that is presented. If it is true that vegetable and animal matter in water renders it unfit for man to drink why not on that delicate machine, the milch cow or the horse? If pure water and cleanliness is one of the preventives of hog cholera why let them drink water from the mire, or rather, why have a mire at all? In this county pure water is easily obtained, but shallow wells—wells that do not reach into the limestone—and tile ditches, or even open ditches may always be suspected of being impure on general principles. Neither running water nor clear water is necessarily pure water. Economy requires that we furnish pure water in our homes and to our stock.

If two-thirds of the corn crop put into the silo will feed the cattle, sheep, horses and hogs better than the whole crop under the ordinary wasteful methods, then the ordinary method is not economic. If one-fourth is added to the value of the corn crop, with no extra expense, by cutting it up and shredding the fodder—then the ordinary method is false economy. If level cultivation keeps the soil in the best condition to cope with excessive moisture or continued drought and if the thorough pulverizing of the surface of our corn fields increases the product from one-fourth to one-half, then the other methods are wasteful—not economic. It may be true that very cloddy fields have produced good crops of wheat, but if that is not the rule don't follow that method. It may be that potatoes planted in the dark of the moon have produced most excellent crops, but if the moon was not the cause then don't wait for the moon. Farming in this land of public schools and advanced scientific attainments has passed beyond the age of traditions and myths.

There is another source of waste connected with the farm which I desire to mention. I suppose that my attention has been the more called to it because for several years I have seen a different process followed. In threshing wheat and other grain in the West the owner of the machine hires his own help, has a cook wagon and feeds his employes near the place of work. When dinner is over the cook wagon moves to the place where supper will be served. The men employed are employed because they are capable and fit for the work. The work is organized and as a result more is accomplished and with less help. The machine moves from place to place quickly, because every man knows his duty. The machine is always kept in repair, because the owner cannot afford to stop work. A few extra parts cost less than hours of idleness with twenty hands to pay. With his blacksmith's outfit he is able to quickly repair the ordinary breakage. They thresh from 1,500 to 2,500 bushels per day. They only ask that the land owner shall furnish the wood and store the grain.

They charge 5 cents per bushel for wheat and barley and 4 cents for oats and cheat.

The following statistics were taken from one of our neighbors during last summer, showing the cost of his threshing according to the ordinary method here, and I may remark that he considered himself very lucky, because it did not rain and there were no break downs causing him to send his neighbors home to be called up when the machine should whistle "all ready:"

Wheat threshed, 300 bushels, @ 4 cents	$12 00
Oats threshed, 900 bushels, @ 2½ cents	22 50
Barley threshed, 300 bushels, @ 4 cents	12 00
Total, 1,500 bushels	$46 50
Time employed, 1½ days, (four men and one team with thresher), 25 hands (neighbors), 1½ days; cost	37 50
100 meals, furnished at 20 cents	20 00
Eight teams employed in hauling grain	12 00
Total cost of threshing	$116 00

OTHER PLAN.

Wheat, 300 bushels, @ 5 cents	$15 00
Oats, 900 bushels, @ 4 cents	36 00
Barley, 300 bushels, @ 5 cents	15 00
Total cost 1,500 bushels	$66 00

Difference in favor of new plan $50, or over 75 per cent.

The outlay indicated above is not fully represented in the common plan, because, as usual, the wear and tear on the mother and daughters of the household are not represented. On such occasions not dinners and suppers were served but regular feasts were prepared. There is a lack of economy in the present system.

As seen above the cost of threshing 1,500 bushels was $116, or 7¾ cents per bushel. Besides just at the time when the threshing ought to be done, corn plowing and hay harvest is on, and the farmer cannot afford to spend twenty-five days in repaying his neighbors for their help. The system will pass away and be forgotten just as the early method of rolling logs has done, because it is not economic.

But while it would be pleasant to continue the discussion of economy on the farm for the remainder of the hour, time forbids and we must give attention to the economy of the home.

HOUSEHOLD ECONOMY.

The original notion of the home was doubtless the place where the family ate and slept. Then it became the place where the family got something to wear. Still later, perhaps, it became the source and place of social refinement. (I am reminded that this looks something like the evolution in the garden of Eden). The home was the place, however, where real kinship was effected—bothers became brothers and sisters became sisters. While the development of civilization has constantly modified the character of the work of the home, the fossil remains of the evolution of the home can still be pointed out and are pointed out with pride sometimes by those who do not comprehend the nature of the fossil. Thus the old spinning wheel, the loom, the reel, the hand-cards, the old and-irons, the crane, the hackle, the distaff, etc., are all reminders of a very significant past to which we are more or less closely related.

But while there has been evolution in the equipment of the home as civilization has developed the necessity for economy has never changed; I may add that waste in the home of the wealthy and in the home of the poor are alike detrimental to the public good. Waste may not always be the destructon of property, but it would be a waste of money to expend it for that which is, under the conditions, wholly useless.

Since the preparation of food was evidently the first exercise of the home it would seem logical to discuss that department first. Since difference in vocation makes a difference in the kinds of food which ought to be prepared, the housewife needs to be as "wise as a serpent" and we hope as "harmless as a dove" in thinking out a proper bill of fare. There must be change from day to day in the preparation of the right articles of food in order that they may be palatable, and hence healthful. This involves two things:

First, a knowledge of the chemistry of foods.

Second, a knowledge of the art of cooking.

These fields are both wide and full of interest. Here again the general government has come to the front by making provision in every good agricultural college for the special study of both the science and the art of cooking. From these centers of education, each year, should go forth young women who are really prepared to direct in the most judicious way the communities with which they come in contact. The great Blatt institute in Brooklyn, N. Y., is carrying on the same work as well as many other private institutions. These phases of education, however, have met opposition, like all attempts which impinge upon traditional and purely empiric methods—not because there is any reason for it, but because the methods are not supposed to be the good old plans. The Household Economy Course, which is usually designated by H. E., in courses of study, has been termed, in derision, by the "innocent ignorant," the Household Extravagance Course. In this way many girls who would have taken the household economy course are deterred. This is the greatest possible mistake. Now let us see what such a course investigates. (I shall avoid so far as possible all technical terms.)

First, what the human economy needs in order to make it healthful, under varying conditions of employment.

Second, what vegetables, grains, meats, etc., contain these necessary foods, and to chemically know how much of this food value can be obtained from each article. The chemist has already analyzed every article of food and has made tables expressing these values, but they must be verified.

Third, how, by art, to prepare these foods so as to be best adapted to the great chemical machine in man's body.

Fourth, to produce healthful foods—free from injurious bacteria. Bacteria, I suppose, are many times, or rather by the many, are looked upon as a myth of the scientist, and as being unworthy of our investigation. When the (individual) student can see the thing (bacteria) or rather the things themselves under the microscope, "faith becomes knowledge." These are not all dangerous nor injurious—bacteria causes the little knots on the roots of clover by means of which nitrogen of the air is laid hold of and enriches the soil. Another helps your cream to become ripe and ready to churn. In the dairy they make cultures of these bacteria for this purpose. Another makes your vinegar from the apples. Another makes your yeast perform its work. Wherever there is fermentation or putrefaction, wherever there is vegetable or animal matter in the presence of sufficient moisture, there bacteria will be found developing. They are the basis of disease, and the germ theory of disease is but the result of the discovery of different forms of microbes prevalent in each form of contagious and infectious diseases. But what has all this to do with household economy? Is there anything more economic than health? This, it would seem, should be the first requisite in the preparation of all foods. If too much is cooked for the meal and thrown away all can see that is not economic because it is waste. The parsimonious, if too much has been cooked, put it away for the future—thus fruits, potatoes, turnips, meats are put away in the same receptacle, exposed alike to the air but hid from the sunlight, and are supposed to be all right just as long as mold is not too obvious. These cold dishes would, under the microscope, be found to be swarming with bacteria, some of them without doubt injurious to health. They eat such things, feel badly, and say that malaria has taken hold of them. They are right, they ate the malaria. Thus it will be observed that it don't pay through false economy to eat the waste. The cooking of too much was waste. We knew a lady—an excellent Christian woman too—who put everything which was not eaten away in the corner cupboard—gravy, beans, soups, meats, etc.—and sometimes these things would stand for a week in this way. The cupboard doors when opened emitted a smell of stale and decomposing victuals. Some of these were warmed over for each meal. She was always feeling badly, complained of everything from headache to rheumatism, and had all of them. The good woman could not stand this always and is now numbered with her mothers. I have no doubt of the cause. Hygienic methods are economic methods.

But while there is much waste in the preparation of food and in the selection of the kinds, it is probable that overeating is as much the cause of disease as the kinds of food taken. We can't afford to eat things in order that they may not be wasted.

The second step in the evolution of the home—clothing, in its different forms—has taken several leaps forward since the "fig leaf" was the lone article. It would not be economic in this age of machinery to spin, weave and make the necessary clothing for the home. But the knowledge of how to cut and fit our clothing, and how to make the accessories of the well-furnished home is economic. Here again the State agricultural college that is up to date teaches sewing, cutting and fitting and the simpler forms of millinery. These are things that every girl should know, whether she is rich or poor. In it there is cultivation of taste, there is mental development, there is culture. The girl that cannot trim her own hat and cut and fit her own dress and make many of the things which will adorn her home is but poorly equipped for the head of the household. Financial distress is likely to overtake that family, because here lies the greatest source of absolute waste. Accomplishments are all well, but nothing can take the place of ability to make things for one's self. Patching or mending will always be a part of the work of the home and if a "stitch in time saves nine" then there is true economy in it.

The man or the woman, the boy or the girl who looks upon physical labor as dishonorable has taken a long step in the direction of failure in his life's work. All honest labor is equally honorable whether physical or mental, and every boy and girl should be so taught.

Economy in the healthfulness of the home and its surroundings has been suggested during the discussion of preceding points, but it is of so much importance that I desire to add some additional remarks.

The home needs sunshine and air. It is better to have some dust than to keep the window curtains closed and the rooms shut up like a dungeon. The parlor that is rarely opened, and only when company comes, is not fitted for the reception of any one except our enemies, if we are so uncharitable. The carpets and walls become the "culture" for innumerable disease breeding "microbes." The same is true of the spare bedroom. Every room demands air and sunshine to remain healthful.

I am told that for every five feet in depth we drain the soil one hundred feet in every direction. Hence a well twenty feet deep may drain the land for 400 feet in every direction. Would this distance include any of your barn lots? The State Board of Health of Indiana recognize typhoid fever as preventable and claim that it is a filth disease. Does it ever occur to anyone that anyone but his neighbors might contract this disease from water filled with animal and vegetable matter? The fact that the water of their wells is perfectly clear is no proof that it may not be loaded with deadly microbes of disease.

Of course I do not need to mention the subject of drainage to a community where tile drainage is so well understood but there is economy in thorough drainage. It saves doctor bills and great and unnecessary suffering.

I wish finally to congratulate the people of Delaware County upon their beautiful farm lands, their splendid roads, on their abundant gas, on its cities and towns and their manufacturing interests. I know of no country where so great advantages exist; I know of no place where there are better opportunities for home markets and all the elements necessary to successful husbandry.

HOW I MANAGE THE FARM.

BY MRS. HARRIETT A. ELLIOTT, JEFFERSON.

[Read before the Clinton County Farmers' Institute.]

Five years ago this winter disease in a much dreaded form came upon my husband, and in order to relieve him, not only the work but much of the care and responsibility was taken up by myself hoping thereby to aid in his recovery; but after an unceasing conflict of eight months we had to yield to the inevitable. The spirit took its flight and I was left alone with two little boys the eldest not yet six years old. I think that none but those of like experience can have any idea of the mountain that stood before me in my sadness. Then came the numerous questions as to what I was going to do and the multitude of advisors as to what I had better do.

Do not think that I was opposed to counsel, for we learn that "in the multitude of counselors there is wisdom," but so diversified was it that I could not use all of it, but if I could have gotten a "corner" on the rest and sold it I would have had at least one source of income. But I could not do that so I accepted the kindly spirit in which it was given and tried to do the best I could. Some, we think, wisely said, "stay on the farm if you can hold it," perhaps thinking I could not do that. In that grand old book which truly is the farmers' book we learn that after the fall of man God sent him out to till the soil and said that by the sweat of his face he should eat bread, and I thought perhaps he meant woman also, especially as she was the sinner, and being neither afraid to toil nor sweat I went to work. Two things I resolved to try to do. First, that as fast as possible I would pay all indebtedness and owe no man anything but love; second, we would live within our means if they were limited. I have rented the fields out to as good farmers as I could get, always reserving pasture, garden and potato patch for my own supervising. I have had the crops on the little farm alternated when I could conveniently do so, following also with clover when that could be made convenient; also had some compost hauled on the places where soil was thin. The cows and chickens were kept indispensable to the farm. So I have planned and worked. True there has not been much time for gossiping calls, but those were not necessary. The idler and the talebearer could do enough of that while I attend to my business, but the sick and the aged have not been neglected if we knew it. Some have thought I must be lonely on the farm, but I would be so anywhere without the loved ones, and sometimes the potato bug and cabbage worm and even the garden hoe well wielded are good to break up a spell of lonesomeness. And I was sometimes very tired, but none but the tired appreciate rest, sweet rest. To say that I have not made mistakes would be wrong, for I have, but I try to make them stepping stones on which to stand firmer in the future. While it is a fact that farm life has its "ups and downs" as we call them, the wet weather and the dry weather, the cold seasons and the frozen potatoes, the injured wheat and the hog cholera, the low prices and so forth, yet I have experienced the fact that the farm has never been an entire failure. On the other hand when one product was not so good something else was better, when wheat was not good the corn was better, when the vegetables were not so plentiful there was more fruit, when the hogs died the calves were extra good, or when there were not so many eggs for market there was more butter, and so on. And now not to boast, but because all unexpectedly to me I have been asked to give some of my experience I would say I have for myself the happy experience of knowing the debts have all been paid, not fifty cents on the dollar, but in full; the taxes have all been paid when due, although that is taxation without representation; much, not all yet, of the water that used to flow on the surface now runs in tile drains and the tumbled down fences have nearly all been rebuilt firm and strong, and the hardware man, the post man and the laborer have all received their pay therefor. The house, although very plain, has been repaired for comfort to the amount of several dollars.

I have tried to render unto God his tithe in ways that as best I could judge were right and while people have been crying hard times and starvation we have eaten of "the fat of the land," at least the fat of our little farm. The bread, the butter and milk have never failed us; then there has been the nice fresh vegetables and the delicious fruits of various kinds with which to tempt the palate of man, and we appreciate the many sources of income from a little farm if they are small of themselves, for out of small things all great things are made. The boys are comfortably clothed and in school regularly and are being taught also to love the farm and to have a more noble idea of life than mere dollars and cents, for I think that one of the essential things on the farm is the high moral training of the boys. So we give you greeting to-day, friendly farmers, hoping to be benefited by meeting with you.

FARMING AND CROPPING.

BY SAMUEL LOVEJOY, KOKOMO.

[Read before the Howard County Farmers' Institute.]

Dr. Cutter, in his work on the human system, uses these words: "Know thyself." Among the things to be understood by this text are the action and influence of the vital organs, such as the heart, arteries, lungs, etc., and laws regulating health and disease. You would not travel on a strange road without acquainting yourself as to the route you should take. You would not travel in a foreign land without a guide. Know thyself in the sense here meant is no more necessary than that in whatever avocation you pursue you should study to know that business. Therefore, if you are a farmer "know thy business."

I meet men on the streets and they say half cynically, "Going up to learn how to farm, are you?" their idea apparently being that if one can do a big day's work on the farm he is a full farmer. The philosophy of farming successfully may not profit those who "know it all," and for their benefit permit me to relate an incident that happened in a Georgia court room.

A big railroad case was on, a jury had been impaneled, the counsel on both sides had made special efforts, had quoted law from Blackstone to Rufus Choate. They had specially directed their attention to the tall foreman of the twelve good men and true. Finally they rested. The judge with great dignity gave his charge to the jury and solemnly informed that body that if in order to reach a verdict they should need any further information on points of law they would be waited upon. Without further ado the tall foreman arose. All eyes were turned upon him. He began: "We uns has hearn the evidence and we knows the law; but they's bein two words used all along o' the tryin' o' this 'ere case 'at we don't understand. We don't know w'at you mean by plaintiff and defendant."

Now if there be any here who think that they can not learn anything more they had better be sure they have got as far as plaintiff and defendant.

Now, while in some sense or other there are all kind of farmers, there are only two general classes: Farmers and "croppers." And the former. i. e., the farmer, is not a very general class either. And the word "cropper" —put that in quotation marks. The term is not original with me, but the class is very numerous.

There are the large farmer and the small one, the landed lessee or proprietor, and the tenant or renter. I am not here to-day to talk as one who began farming with plenty of capital and could therefore farm on correct principles from the start, but as one who has farmed under every discouragement, from lack of capital, want of experience and physical inability. I am here to talk to a class of resident landowners and renters who just have to go ahead and do the best they can, all the time aiming to do a little better hereafter.

Now, I would see some men own more land and others own less. I would encourage the large renter to become a small owner of real estate. Better have twenty acres of your own than two hundred of somebody's else. I want to say to the renter who wants eighty acres of corn, a like amount for wheat and the same for oats, you may be able to crop it for a while, but as a rule you won't farm it. And let me say to the owner of such land, if you want it cropped, that's your business. Just go on asking exorbitant rents and compelling the renter to place on the market all his grain, hay and oats. But to my mind I would as lief a tenant would go in and shovel up so much of the soil and haul it off as take the life of the soil all away in grain.

We can not expect the soil to forever feed us unless we feed it. Study Emerson's "Compensation," and apply to your farms the text, "Give and it shall be given unto you again."

Now, Mr. Renter, a word with you. Admitting that land ought to be "farmed" rather than "cropped," if you are able to rent 160 acres, buy all necessary implements and stock it up to farm it, you are able to buy forty acres and own it. I want neighbors who own and till their own soil, if not more than ten acres. You say you will have to go in debt, you will have to mortgage it; that will never do. Let me say to you that while there has been a great deal said about mortgages—and they're about as common as deeds—there has never been a mortgage deed wisely negotiated in Howard County, the mortgager minded his business, that he had to give up his property to foreclosure. Do you stand well with your neighbor, the merchant and the banker? Some of you may say, "Well, no; I haven't much use for the banker." Well, in that case you will find that he has about as little use for you.

Now, let us be candid. I have been borrowing money at the banks ever since I began farming, and I find the bank the best place to borrow and the easiest place to pay a debt of any place or person of whom I ever borrowed money. Stand well with business men. Your debts will not bother you any. You can stand against the world.

Do not understand me as wishing to encourage debt other than as a means of stepping to a higher plane of more independence in life. The bank is indispensable to the farmer or the town where there is any enterprise or business going on. But suppose we be more conservative, have nothing to do with banks or eastern loan companies and give up all enterprise. Suppose they say among themselves: "Railroad stock is not paying, manufacturing is overdone, let's go out and buy up these farms and make our own terms to tenants. Then you who want to rent farms (being fitted for no other business), will you not have taken a step toward that condition of which Bryant speaks when he says, "Go not forth like quarry slaves scourged to your dungeon?" It is by your own negligence, discouragement, want of enterprise, and lack of method that we invite aid, and abet all the ills and abuses of which we groan and complain when 'tis too late.

A few years ago wideawake men, when they saw the revolution of agriculture in foreign lands, when they saw in every other occupation in our own country united effort and concert of action, put their heads together to see what could be done for the agriculturist, and they brought forth the Farmers' Institute. The child was born, and although it got a good many kicks and cuffs at first, it's able now to give and take. It was supposed the coming together on the common level and discussing the questions involved in our business among ourselves would lead to better methods and better results in farming. We have those in the world who manufacture, anticipate and lead public sentiment; those who originate the best thought of the times and those who reflect public views; and lastly those who reluctantly follow and object to every new thing till their neighbor has tried it. They objected to the binder because it wouldn't save the wheat, when it was the first machine that ever did save it. They objected to the cultivator because they could handle one horse better than two and get closer to the corn, when just the reverse is true. I might illustrate ad infinitum. I would not surfeit you with Josiah Bounderly and Thomas Gadgrind facts. But we ought to study our work, adopt and hold fast to that which is good.

We need not and ought not believe all we see or hear coming from certain papers, persons or places. It might lead us into error. A certain preacher was wont to advise his flock at every recurring discourse to discard all other books and papers as ungodly and unchristian save the Bible, but to believe every word in it just as they found it. He told them on one occasion that his next talk would be on Noah. Some of the boys got together and wickedly cut out a leaf or two and pasted them together. And the preacher read: "And Noah took unto himself a wife, and" (turning over a leaf) "it was 120 cubits long—brethren, we must believe—and eighty cubits broad, and forty cubits thick and lined inside and outside with pitch. Now, brethren, I believe this 'cause I see it here.

They had giants in those days; and I suppose they had giantesses and it may be this was a woman suffragist."

Now who is the farmer proper? It is the man, generally a resident owner, who so manages his farm that each succeeding year finds his land in as good or better condition than the preceding year. It is the farmer who is not waiting for a good season or a change of administration. It is the one who in figuring on net results has an eye on the condition of his fields. It is the man who, when he plants, knows he will raise a crop and knows how to handle it when it is raised.

Some of us sell our stock to the butcher and then sell them our grain to be fed down below the city. Hundreds of dollars worth of manure float down the creek every year. Thousands of dollars' worth of corn are shipped out of the country. If you can not feed your corn at a profit, cheap as it has been for the last three years, how can the New Englander or Southerner feed it at a profit when it costs him twice what you get for it? How is it that some of you fed a nice bunch of cattle every winter when corn was high and cattle cheap, and now when cattle are a good price and corn is cheap you can not feed cattle? Some of you have one or two old cows and sell the calves at six weeks old; but you have ten or twelve head of horses, when three or four are all you need.

You ought to sell your horses at six weeks old and keep your calves.

Why do you thresh your straw out in the woods every year and let it lie there? Why do you feed those hogs every year on the same patch and never cultivate the lot in anything but jimpson? Why do you throw manure out of the window only to burn itself up in a heap and rot the plank off the side of the barn, when you can haul it cheaper, as it is made, and make one handling do the work? Why does my neighbor cultivate that field every year and never let it stand in clover during the summer?

I take a clover sod, drained and manured, and with less work raise four times as much corn on the same number of acres. I let my clover stand and make two dollars where my neighbor makes one cultivating the soil.

In the animal and vegetable kingdoms the Great Architect has provided a perfect relation and complete system of economy. Such a system that whatever is lost to individuals or communities, temporarily or forever, is through their carelessness and ignorance. Time here does not permit delving into scientific details. Suffice it to say that of all vegetation that appropriates what the animal world gives off, leaves it just where you want it, acting at the same time as your only perfect subsoiler, the little red clover is queen.

The child may ask, "How does that river flow on forever and never go dry, or how does the water come down at Ladore?" But as the sun warms the air, makes it lighter and it ascends and colder air rushes in and a current is formed, as its business is to carry the moisture back again and make the rain or snow in the mountains that melts and forms the stream, as heat of the sun starts the ocean currents that flow on forever, so is that red clover field, appropriating from every breeze that stirs and every rain and dew that falls, and recreating, mending and building up, that the animal world may continue to live.

Did I live in a heathen land where my neighbor got down to worship his Buddha and his graven image I'd want to get me a little clover field and get down and worship it.

A doctor says to me: "You farmers have no kick a coming. You hire too much. Would it hurt a farmer to husk corn for ninety days?" And I know farmers who do this. They're out in the mud now. Some home could have been made happy by a little outlay at the proper time, and the farmer the gainer too, for his grain is damaged more than the half of its original value. I want to say, therefore, that the farmers don't hire enough. They don't do their share of employing those who have no other means of living. They want all the land in sight to run it in a certain line and howl about the markets, when they do nothing to make a market.

Some farmers sow clover and when the tender stems have breasted the winter storms and it just begins to think now it can grow, in comes the farmer and plows it all up again for more corn. Why, I would as soon think of plowing up a nice stand of corn to sow it in buckwheat or turnips.

An English writer has said that the desire to get out of work was the greatest curse of the world. But I say to you, we have instances among the farmers where a desire to do all their own work, where individual stinginess and supposed economy is a curse. Over there are two ten-acre fields with just a fence between; soil the same. One produces twenty-five bushels to the acre, the other, seventy-five bushels of corn. Ten dollars' worth more of work at the right time put on the first would have given the employer a profit of seventy dollars, and the ten dollars have gone into the family of the wage earner.

Thomas Francis Meagher, in a last desperate appeal to the Irish people, used the following language: "You will sit and moan and grumble and bewail your fate in poverty, filth and rags and dirt and squalor." God grant that an American audience may never be thus addressed. If you will examine the conditions of the old world, especially in all the Asiatic countries, no language save the language of the soul can express your gratitude that you live in a land where (though we have our grievances) we have the wisest laws, the noblest institutions, and the greatest opportunities, under the stars and stripes, of any people on earth.

ODDS AND ENDS ON THE FARM.

BY A. E. SWOPE, ZIPPS.

[Read before the Vanderburgh County Farmers' Institute.]

This is the time of year of all others that the subject of my remarks should be brought prominently before the eyes of farmers.

I will endeavor to give you a few items as they occurred to me and you can take them home and think about them these long winter evenings. and if I have brought forth any point that any of you are lacking in and will cause you to put on your thinking cap I will have accomplished all I desire.

"Odds and ends on the farm" is the one branch of agricultural industry that is most generally neglected as it is considered chore work by the most of us and put aside from time to time as other more pressing work seems to demand. Yet there is a time when these odd jobs should be done no matter what the other work may be. "A stitch in time saves nine," for ten or fifteen minutes to stop up a hog hole in a wheat-field fence just before the wheat is ready to cut would probably be cheaper than to wait and build a new fence two weeks later when you had finished cutting. From half an hour to an hour spent in putting away your binder or mower and in putting a little oil and tallow on the guards while they are bright would be a great deal cheaper than unhitching in the field and letting them stand for the next crop, and then probably it would be a new machine or a good sized doctor bill for the repair shop. A machine handled in this way will last about three years, while if properly housed will last ten or twelve years. Yet, this is one of the odds. Work is rushing at this time and a little later it is too wet or cold and then we say, "Oh, well; let it stand now, it has been out this long and it will not be long until next harvest;" and in the end a man's pocket is the loser. A few minutes to make a small sled large enough to haul your plow and harrow from the field when you have finished the field or a rainy season is threatening, and you will have a handy contrivance to move your tools with; and in many instances you'll find your implements at the barn in bad weather, while had you left them to find a convenient time to go after them with the wagon they would probably have been out in the weather all winter. Then after your plows or cultivators have been brought up wipe them off dry and have an old can or bucket with some kind of oil or grease in and then with an old paint brush give them a good application of the mixture; no necessity of "shake well before using." Don't put this off now until a more convenient time for your plow will be rusted and the next time you want to use it you will feel like using words or combinations of words that would be impossible to find in Webster's Unabridged, all because the old plow won't scour, when five minutes at the proper time would have saved you considerable time and bother. Remember the old adage, "Procrastination is the thief of time." Have a shelter for your farm implements. If you haven't any, now would be as good a time as any to make it. One of the many things that is classed with the odd jobs or put off until the other work will justify is the average farmer's garden, while it should be the richest spot on the farm and kept in the best shape. Commence in the fall to prepare your garden and put the first work in the spring there and devote a little time each week throughout the summer to tending the truck and you will be surprised to find how much it will save your grocery bill. Have the garden handy to the house so the wife can get the eatables for table use and can have them fresh every day. Do not understand me that I intend for her to perform any of the labor connected with raising the vegetables, but if the lettuce, radishes, butter beans, onions, celery, etc., are handy you will always have a good table and should your city cousins step in they will be treated to as good as the market affords. Help your wife to clean up and keep clean the front yard, spade up the place she might wish for flowers, set out the rose bushes, trim the shrubbery, keep the fence whitewashed and straightened up so as to keep out all stock especially the chickens, for if you let an old hen into a woman's flower bed you'll never hear the last of it. Fix up your yard and premises in general. Beautify your home, make it pleasant for yourself and children and others will find it the same.

Listen to and take the advice of your wife; she can give you pointers and suggestions that you would not have thought of and will save you many blunders. In the meantime cast your eye over the route your wife has to travel in hanging up her clothes on wash day and notice how far it is and how high the grass and weeds are around there.

Then, going down to the barn, straighten that old lumber pile, pick up that piece of board with that nail in, it might cripple a horse. That pile of sticks or clubs lying around the cow stable might be disposed of. Repair the water troughs or gutters on the barn so your cistern will be filled with good water and you may not have to haul water next summer. Nail slats over the cracks in the barn; fix the doors so they will close easily and take the time every night to see that they are closed; keep the draft out and you will save feed; take the time to fondle the colt, teach it to lead with a halter, make it gentle by handling and he will never know the time when he is broken. Try the same method with the calf you intend to raise.

The chicken house needs extra attention to prepare it for cold weather, hogs need clean beds and bedding. Shut up the grates under your house and in the cellar; attend to the washes and ditches in your fields this winter. A little straw or rubbish at this time will save you the use of the Armstrong machine in wheat harvest and the binder will be able to cut the whole crop instead of pulling around ditches.

While in the woods cutting stove wood cut some good oak or hickory timber, haul it up to the shed and let it season and at some odd time this winter you can make your single-trees, double-trees, neck-yokes, etc., and with a little red lead and linseed oil you can put as good a finish on them as if they were just from the blacksmith shop, and next summer should you happen to break one you do not need lose any time going to the shop for repairs. Of course to do this you must have a shop or building where you can make a fire and work there at times when it is too disagreeable outside. Then with a few carpenter tools, shoemaker's outfit, etc., you are fixed to save time and money, sole and mend your shoes, repair and grease all the harness. Another good addition to this shop is a shed large enough to put your coal and stove wood in and when it snows you do not have to go out and shovel to find your wood. Besides this you have a handy place for numerous other odd jobs, such as hog killing, cutting up old rails, etc. It is astonishing to see the odds and ends, old logs, etc., to be found in our woodland when a little work every winter would suffice to make a splendid pasture of it and keep it in a state of both beauty and profit.

'Tis often said that man's work is from sun to sun, woman's work never done. A farmer that is really one of the progressive kind and one worthy of the name, resembles the woman in that his work is never done. There are seasons of rest for the make-shift farmer and seasons when there is less rushing work to be done, but in the proper use of the season of comparative leisure is found the best safeguard against the possible hurry and worry of the busy season. Many odds and ends too numerous to mention can be done in the winter season to prepare the work or save work when spring opens up, and last but not least, I would recommend for our homes all the good literature, books, farm journals, a magazine for the wife and some good juvenile works for the children. Have a variety of complete sets of our best authors, and in odd moments in these long winter evenings we have ample amusement for ourselves. Not only this, it broadens our intellect and makes us more useful as citizens of a community. We are better prepared to lay our plans for the future and fight life's battles.

Have a little music and a few songs, infuse new life into your family circle. These are a few suggestions offered that have probably become a matter of routine with some of you older farmers, but we younger ones may see where we can improve by keeping on the alert. And it will be "odd" that if in the end by putting into practice some of these ideas we cannot save time and money.

December.3 and 4, 1897.

SOME SOURCES OF LOSSES IN FARMING.

BY OTTO KAMP, KASSON.

[Read before the Vanderburgh County Farmers' Institute.]

Few, if any, farmers can look back over the records of their transactions and operations without seeing some heavy losses they have sustained that might have been otherwise avoided. I am convinced that it would be profitable for farmers to spend a share of the thought now given to means and methods of production to studying how the products of their labor may be better utilized. The course of the development of farming has been (1) larger production through clearing, draining and enriching the land; (2) cheapened products through employment of machinery and specialization. The next step that is now being forced upon the farmers is the lessening of expenditures. Expenditures that were once safe and wise to make are not so now. Others made in expectancy of more favorable conditions have resulted in losses.

It is commendable to plan for the future, making transactions and operations prepare the way for something else. But when the forward look merges into speculation and chance-taking it is to be discouraged. It is not so much speculation in the way of investing for a rise in prices to which farmers are addicted as it is to buying of new machinery when it is first offered which we could do without. Buying new breeds or strains of animals, paying dearly for the pedigrees and the owner's reputation, and buying new seeds. Were the amounts thus annually spent to be published, they would certainly be appalling. Could the farmer have back to-day what he has recklessly spent during the past year he would feel happier and more content. Machinery must be used as a profitable investment. What may be profitable for my neighbor may not be profitable for me. An implement used only a few days in the year and allowed to stand in the weather the remainder of the time is certainly a bad investment.

I believe the greatest occasion of loss with the farmer is that he attempts too much, so that the details of his work, that determine the profits, are compelled to be neglected. He gets in such a hurry in his work that the little repairs to machinery are neglected. They are run with loose nuts or without oiling, with the results that a new machine is to be bought in less than half the time that should be necessary. Then the amount of machinery that is allowed to stand in the rain and sun is as disastrous as fires. One ought to consider where an implement is to be housed, as well as the service it is to perform, before purchasing it.

Do I not speak the truth when I say we, as a class, overdo in our planning? We, or at least some of us, put out more crops than we can attend to as we know they should be, and consequently we see partially completed products lost for the want of proper attention at the proper time. Again, in our attempt to find something that will pay, we put out some crop which we haven't implements to care for; if we purchase the implements, the possible profits are lost before secured; but if we do not, the crop is a partial or complete failure. We buy fine stock and are not able to care for them as they require. In many cases I have seen valuable animals that have been injured or lost through forced neglect. Other instances of losses that are constantly about us are stock damaging crops through neglected gates and fences, and in many cases injuring themselves; consequent loss of growth in young stock; failure to breed animals at the most advantageous time, and failure to make proper provisions for young animals. Sows are allowed to farrow where the pigs perish through want of proper accommodations. Young colts are injured in thorough development through indirect and improper treatment. Young lambs die for the want of proper attention. Cows shiver and fall in the flow of milk from neglect to keep under proper and often possible shelter. The nursery agent gets a share of the hard-earned money of the farmers from which the latter never realizes the promised profits and pleasures. This is due, in part, to too long promises, and in part to inability and neglect on the part of farmers to give their investments required attention.

Think of these things, my fellow-farmers, and save dollars where hundreds have been lost.

THE PROGRESSIVE FARMER.

BY PERRY C. LAFUSE, LIBERTY, IND.

[Read before the Union County Farmers' Institute.]

Of all earth's noblemen, none possess more independence nor greater opportunities than the farmer. There are none that bear so much responsibility for the world's enlightenment. Upon him depends the growth and wealth of nations, the advance or descent of civilization—indeed, the perpetuity of all that is ennobling and good.

Unto the farmer the pursuers of all avocations of life must look for their success. Just as, step by step, the farmer succeeds and advances, so all mankind is lifted into a higher plane of living. The greater the demand for improved agricultural implements, the larger becomes the skilled mechanic's field of labor; more extensive are the areas of cultivation; better is the tillage of the soil and greater its production. Then it is that the whole world leaps forth into action, railways lengthen by miles, larger and more swift become the ocean steamers; the merchant must be more shrewd in his business, the manufacturer more artistic and inventive.

So, every line of employment receives, in its turn, an impetus sent forth by the successful farmer. Not only do all trades and commerce depend upon the art of agriculture as their foundation, but also the intellectual and social world for their masters. The learned men of all ages—philosophers, bankers, statesmen, orators—from Cicero to Kossuth, have had their earliest training on the farm. Show me a nation that neglects the tillage of her land, and I will show you a nation of poverty, a people of debased morals, of endless contention and murder. For example, look at Spain of to-day, at Russia, at Brazil.

It is agriculture, in a highly improved state, that is the means, next to righteousness, which truly exalts a nation, that will contribute to its enduring prosperity. And, of all the pressing necessities to-day for the betterment of our country's welfare, there is none greater than the need of more progressive farmers.

In the first place, a progressive farmer is a true citizen—one who fully realizes the responsibility he bears to his God, to his country and to his fellow-men. He is a man of honor and influence among his countrymen; a man of much thought and integrity, of great courage and stern determination. His mistakes and failures may be many, but by his determined will they become stepping-stones to success. And success brings progress. Early in life he has learned the truth of the old maxim, "God gives all things to industry." It is only by earnest, persistent effort that the higher realms of any profession can be reached. And yet, so many farmers never succeed chiefly because of this one fact. They seem to have no business of their own, to observe nothing, to know but little except about some of their neighbors' business.

It is just such farmers that are continually complaining that "farming doesn't pay," of "hard times," and, groping in their ignorance and misery, confer the cause to the administration of the government, to the capitalist, to the lack of money in circulation, and so on.

"Men are usually tempted by the devil," but such men positively tempt the devil. And, under his protecting care, they are the curse of the nation's prosperity.

The progressive farmer lives on the farm. In the fields and among his stock is where he loves to labor. Hard work, close observation, strict economy and the determination to know his business are the impelling motives that bring to him all the prosperity with which heaven blesses humanity. Failure has come to many a farmer because he failed to learn his trade. Lack of knowledge does not imply lack of ability to think and to reason. All men. unless of idiotic, impaired or diseased minds, are possessed of the faculty of reason, and should use it for the purpose for which it was given—to supply needed helps for our temporal existence.

Then, a progressive farmer is a diligent student. He can find no task too difficult to be mastered; no question passes unnoticed, unsolved; not only those pertaining to the farm and the farmer, but all questions that influence humanity, peculiarly interest him. The world grows wiser and better by his living in it. By thought he gains ability, and from ability, system, courage, attention, application, the most valuable aids to every man of business. It is the knowing how to manage and to do farm work, the application of knowledge, that insures success. The right thing must be done at the right time. System and punctuality go hand in hand; in all undertakings, both great and small, they are of the greatest importance. Nothing that can be done to-day should be put off till to-morrow. To-morrow may never come, and, should it come, may not changed conditions and difficulties render set tasks impossible? "Work while it is day," says the Scriptures, "for the night cometh when no man can work."

Then he who would thrive in his farming must lend his whole will and purpose to it. A man's individual experience is limited, but from the united experience of many who have traveled the same or similar roads may be gained ideas that might never be thought of, and worth thousands of dollars. All that has made the world what it is to-day is ideas that have been worked out by energetic men.

The farmer of to-day possesses greater opportunities to gain knowledge than of any previous age. For no other purpose were the Farmers' Meetings instituted, or are agricultural papers and books printed.

"Wisdom is the principal thing," says Solomon: "therefore get wisdom. and with all thy getting get understanding."

WINTER EMPLOYMENT FOR THE FARMER.

BY E. G. TUFTS, AURORA.

[Read before the Dearborn County Farmers' Institute.]

The employment for the farmer would necessarily vary with the farmer himself, his surroundings, his farm and its improvement. I believe a farmer should be as regular and systematic in his work during the winter as during the summer. He should employ every hour of his time at something. "Not a day without a line" was the maxim of Apelles. The farmer's motto should be, "Not a day without its work." If the weather is too severe to work out of doors, he should find employment under shelter; if too cold for the shop, he could use his time to a good advantage in studying and laying out his plans for the following year; or in reading upon subjects with which he wishes to become better acquainted.

He must not spend all his time in manual labor, for the successful farmer must keep up with the rest of the world; he must keep himself wide awake and his mind active by reading the best agricultural papers and books, attending the institute, the meetings of the Grange or other farmers' organizations. The long winter months afford much leisure time for the wide-awake farmer to take advantage of in preparing for the rush of spring and summer work.

During the early part of winter there is usually a time when the weather is pleasant, and the ground unfrozen, when a farmer could do some plowing for his spring crops; this, of course, would depend upon the kind of soil and location. But he should by all means plow his garden in the early part of winter. All fences that need to be built or old ones repaired should be built or repaired at this time. Any improvements in the way of buildings should be made some time in early winter.

While winter approaches and the ground is frozen is the time to cut and haul the next year's wood; or, if there is nothing else that is of more importance, he could procure two or more years' supply and thus have it dry and well seasoned. During the winter the farmer's horses are usually idle; therefore, a bill of expense. The successful farmer must manage to work his team as many days as possible. This could be done if he lives within a reasonable distance of a town, and nothing else urging, by hauling manure from the city and spreading it upon his land, thereby increasing the fertility of the soil and saving his ready cash that otherwise must be expended in the following spring for commercial fertilizers, or produce poorer crops in return for his hard labor. This is a winter employment that is as important and profitable as any, and should be considered by the farmer when his horses are standing idle in the stable and he himself sitting by the fire, more often in the village, patiently waiting until spring to begin work, until he is always behind with his crops, complaining of "hard times," and "farming don't pay." If more farmers would employ their time and that of their horses we would not see as many poor farms nor so many farmers so deeply in debt.

No farm is complete without its workshop well supplied with tools. Here many days may be profitably employed during the winter and summer that otherwise would be spent in idleness.

When winter sets in in earnest, or it is raining, sleeting or snowing, then is the time to build a fire in the shop, tack a sign over the door, "No loafing allowed," and put all hands to work. He should repair broken plows, harrows and other tools, and see that all his implements and wagons have a fresh coat of paint before spring. There is nothing with as little outlay that places as many dollars upon the credit side of the farmer's ledger as good paint well applied to his farm implements and buildings.

The successful farmer will plan to manufacture as many articles as he can that otherwise he must buy. Many times a farmer expends hundreds of dollars for new implements and for repairs that could just as well have been saved if he had employed his time during the winter. Possibly the farmer needs a new wagon-bed, harrows, gates, sleds, drags; the harness needs repairing, forks and hoes to be fitted with handles, and plenty of other work that could be seen and undertaken if the farmer is wide awake, farming for profit as well as pleasure, and has energy and skill enough to accomplish such work.

If the farmer is a gardener or fruit grower he should manufacture, paint and stencil all necessary bushel boxes, berry crates and baskets. The boxes and crates should always be painted one color, and this continued from year to year. It makes the boxes and crates look nicer; it helps you to keep them from getting lost. It also attracts the people's attention and thus secures you trade.

Shelling seed corn can be done to a good advantage on cold, stormy days. The colder the weather the better the corn shells. A few bushels extra seed will command a good price from the man who has all such work done for him.

Usually in January comes the time to harvest the ice crop. This is a crop so cheaply raised and harvested that it is a surprise so many farmers fail to avail themselves of the opportunity to supply themselves and their family during the coming summer with the luxury of all the ice they may want to use. Here, again, is that lack of energy that is always necessary to make the greatest success in whatever occupation one is engaged.

In the latter part of winter many farmers find employment in manufacturing maple syrup. Some are of the opinion that there is no profit in making syrup at the present market price. This is a question upon which much can be said; but I believe, if well managed, it can be a source from which some little revenue at least may be derived.

In traveling through the country, if one is a close observer, he will readily see that the thriftiest and most progressive farmers are the ones who employ the winter months to the best advantage. Too many farmers rely upon "good luck." It is not luck, but labor, that makes a successful man. "Luck," says an American writer, "is ever waiting for something to turn up; Labor, with a keen eye and a strong will, always turns up something. Luck lies in bed and wishes the postman would bring him news of a fortune; Labor turns out at six and, with busy pen or ringing hammer, lays the foundation of his own fortune. Luck slips downward to self-indulgence; Labor strikes upward and aspires to independence."

In all labor there is profit, says Solomon. Productive industry is the only capital which enriches the people and spreads national prosperity and well-being. The most profitable employment is the half day or evening spent at the meetings of the Farmers' Institute, the Grange or some other farmers' organization, where they "propose meeting together, talking together, buying together, selling together, and, in general, acting together, as occasion may require," spending their time in social enjoyment and elevating their occupation by education, co-operation and legislation.

Some one has well said: "These organizations are carrying into the scattered and often isolated farm houses of the nation a sense of brotherhood, of social fellowship, an atmosphere of sound morality and a high regard for religion, which comforts the hearts of hundreds of thousands of men, women and children, and makes farm life a brighter, happier, noble experience for all who come within the shade of its ever-spreading branches.

SHALL FARMERS INSURE THEIR PROPERTY IN THEIR OWN COMPANIES?

BY CHAS. P. MILLER, GREENSBURG.

[Read before the Decatur County Farmers' Institute.]

To intelligently discuss this subject, we need to study the history of the mutual companies and the capitalized or old-line companies, and compare results. Believing as I do, that farmers should insure their property in their own companies, and that it is a subject worthy of discussion before a Farmers' Institute, I consented to prepare this paper—not that I felt myself able to do the subject justice, but hoped that I might offer some thoughts and figures that would lead to a healthy discussion of the question by the president of the Decatur County Mutual Company, and others.

We have at our county fairs and races a class called "free-for-all." But we find certain rules governing this "free-for-all." But the farmers, bless you! are a class free-for-all without any restraining rules, and when you suggest mutual combination for insurance, or any other purpose, you cause him an uneasiness about his heart, and he will have terrible nightmares of things too hideous for an amateur to describe.

Notwithstanding this inborn disposition of the farmer to avoid co-operation and trust corporations, the county co-operative fire insurance has come to stay. The law-making power, realizing the fact, put upon our statutes a law governing such companies and providing for the protection of both the insured and the insurers. Quite a number of counties in the State have been organized under that law, and have been in operation for a number of years, and have proved to be not only safe, but the most economical insurance for the farmers.

Enough of the farmers of grand old Decatur County shook off the spooks and goblins of distrust in their fellow-farmers and organized the Patrons' Mutual Fire and Lightning Insurance Company, in June, 1877, under the counsel of two of the best law firms of Greensburg. Having secured the $50,000 minimum insurance, the company was launched in the teeth of the jibes and jeers of the agents of the old companies and the Doubting Thomases among the farmers. It has steadily grown till it is over a million and a quarter strong, and is growing more rapidly each succeeding year. Nothing succeeds like success. Insurance companies are like other business concerns—they are judged by their strength or ability to pay, and the per cent. or amount they are able to save to the insured. Now, as to safety or ability to pay: I have shown that these co-operative corporations are legal, capable of suing or being sued. The companies are provided with a minimum amount of insurance. If they fall below this the company ceases to exist, and members are free from all obligations. While the company is above the minimum no one can withdraw from the company till his part of all losses have been paid, his real and personal property being liable for the same. As long as Decatur County real estate is good, so long will mutual insurance be good in the county.

Each policy holder in a co-operative company is a full member and has as much power in managing the business of the company as any other; that is, the man who carries $50 insurance has as many votes as the man who has $5,000. Hence there cannot be any voting by shares of stock, of salaries, equal to the salaries of capitalized companies. Co-operative companies do not have to support a set of lords and barons to have their property insured, but can operate the company at actual cost of necessary labor for doing the business of the company.

For the relative cost in mutual and capitalized companies, we will take the twenty years of history made by the Mutual Company in this county. We find that in the twenty years there have been 17 assessments made, amounting in all to 23½ mills on the dollar, or $23.50 on the thousand for twenty years; or $1.17½ on the thousand for one year, or 11 cents and 7½ mills on the hundred. Rates of old companies on the three-year plan is $1, or 33⅓ cents a year on the hundred.

Now for the comparison. If there are any Doubting Thomases present, let them get their paper and pencils and take down the following figures, and take them home and let their thinking boxes work on them:

20 years in old or capitalized companies on $1,000	$66 66⅔
20 years in mutual on $1,000	23 50
Difference in favor of mutual	$43 16⅔
Interest on difference at 6 per cent	2 58

Deducting average assessment per year—$1.17—we find the amount saved in interest will more than pay annual assessment by $1.41, or the interest on the money saved to the charter members will more than twice pay the annual assessment.

Is it a wonder that of the companies that are alive and live in the county not one has withdrawn and all are its warmest friends?

If one of the charter members had, each year, put in the bank the difference between the mutual and the old companies and had neither received use nor interest, he would have enough money in the bank, saved by so doing, to more than pay his assessments at the same rate for the next twenty years. There has been at least $25,000 saved to the members of this company.

I have heard it said that figures will not lie, but speak the truth oftener than words. To one that has enjoyed the benefits of mutual insurance for twenty years they speak with no uncertain sound.

Mutual insurance for farmers is good, cheap and reliable; keeps the farmer's money at home; all losses are adjusted by our fellow-citizens, not by a slick, paid agent; all laws pertaining to mutual companies are what the policy holders make, and can be revised at annual meetings as long as they do not conflict with the State law.

Many other counties have had as cheap or cheaper insurance than Decatur.

If you want to keep step in the march of progress, insure your property in mutual insurance companies.

THE OVERWORKED FARMER'S WIFE—WHAT IS THE REMEDY?

BY MRS. ROSE J. CHANCE, WESTFIELD.

[Read before the Hamilton County Farmers' Institute.]

This has been given me as a subject to prepare a paper from. No doubt at first thought many will greet the matter as an old and threadbare theme; but just wait and see. We that are farmers' wives see this glaring at us in almost every farm paper. We realize it as a startling fact every day of our lives, and when statistics show that 40 per cent. of the inmates of our insane asylums are the very same wives of farmers; when we read in almost every paper accounts of suicides among this same class, is it not high time that farmers themselves should awaken to the horror of the situation?

But they seem to accept it as a matter of fact, and if ever a remedy suggests itself, they are slow to act or deem it altogether not practical. What is the remedy? Where shall we find it? Echo answers, "Where?"

An incompetent title to the subject makes it a little bit difficult to get thoughts in shape just as I would like with suggestions as to remedies. In dealing with these things in life we should deal with an evil in the light of cause and effect; hence I beg pardon if I presume too much in changing the title to "The Overworked Farmer's Wife—What is the Cause? What is the Remedy?" There will be but little humor (the gravity of the situation forbids), some pathos, probably, and perhaps a little profanity. I must speak further in regard to the fearful amount of insanity that is finding so many victims in homes that should be the place, of all others, for joy, peace and happiness; that is, a country home. One of the causes of the mental powers giving away to such an alarming extent, as the "sports of the turf" would say, we are "track sick;" with the everlasting monotony, hard work, isolation, lack of appreciation, etc. Oh, of course, we have a variety of work; we cannot complain about that. Insanity is produced by anything that affects the mind so forcibly as to take the attention from all other affairs. With several years of experience and observation, I am convinced that there is one particular kind of work that does more mischief than all the rest put together, and it is a peculiarity within itself, as it strains both mental and physical powers, and that is the cooking. If it will be any more convincing, I will inform you that three different physicians have been consulted, and they fully agree with me as to the cause of the most mischief. We have a great many duties that get tiresome and monotonous, but the king demon of them all is the incessant, never-ending, never-to-be-neglected round of cook, cook, cook, year in, year out, three meals per day, sick or well, hot or cold, wet or dry, that wears us out, body and mind. There is perhaps more truth than poetry in the expression made by a Tipton County farmer's wife not long since, when she said: "If it just wasn't for people's darned stomachs;" and I feel sometimes like repeating what she said, and adding that if people did not demand so much attention to their "darned stomachs" the farmers' wives would be in a happier condition to-day. And yet, we must not forget some of the tender mercies shown us. We find that in the creation the human family has been considered the noblest work of God, and in His wisdom we are not made as the ox of the field, for we find in our study of anatomy that he was given three stomachs instead of one. So let us be thankful for that. I intend to hew close to the line and make the chips fly, but no one present need dodge for fear of getting hit, as all the farmers I am writing about live in Posey County—none of them present—so we can talk about them just as we please. Mention to most any person a protest against farmers' wives having to cook so much, and what will you hear? "Oh, they should prepare more simple meals." "They want to set a better table than their neighbors." "They should prepare Sunday dinners on Saturday." Oh, yes; we agree with you; but, great goodness! We have to prepare enough to fill empty stomachs, and when we are trying to cook for our own families, then have to board a lot of workhands, the Saturday's cooking is more than we can hardly manage, so how can we have time or strength to get the Sunday dinner the day before? That is no remedy for the evil, and we get tired and sick of all such rubbish. Now, most of us enjoy preparing a nice meal for our families, and esteem it a pleasure to have our friends come to see us, set a nice table and give the best we have; but how can we do this if we must go on forever boarding a lot of men to do the work required on the farms, with no hope of relief this side of death? This is one of the evils that cause our spirits to break, ambition to die, and at last we sink into our graves, glad to rest from it all. If anything is undertaken on the farm requiring a lot of workmen, it seems there is never any way to do but to board them. Most farmers consider they do their duty if they hunt a girl to assist in cooking for them. No difference how competent and cleanly the girl, or conveniently you have things arranged, your wife carries all the responsibility; she has all the brain work; hence the exhaustion. Dr. Talmage says: "The fallen at Chalons, and Austerlitz, and Gettysburg, and Waterloo are a small number compared with the slain in the great Armageddon of the kitchen;" and yet how beautifully poetic the reading on our tombstones are, how consoling. As to remedies, so many different things have been suggested that unless farmers themselves can be brought to see the mistakes and try to rectify them, but little can be done. Page upon page has been written on the subject for years, yet the horrible car of the Juggernaut still rolls on, crushing the lives out of its victims every day. We will mention a few things that silently and swiftly work irreparable mischief, although it seems almost impossible to solve the problem for a betterment; yet it will have to be done if you wish to save your wives, have them bright, happy and cheerful, as in days past, ready to greet your friends joyously, delighted to drive out with you, have her to be the same light-hearted little sweetheart that she was years ago, and be assured nothing gives her greater joy and happiness than to keep your home bright and cheerful and work to secure the welfare and comfort of her dear ones.

First. Arrange somehow to do away with boarding men that you must hire to assist in your farmwork. But you say that single men are the only help available. Well, have them get married and be a tenant. It is to this problem that the "Bureau of Labor and Transportation" is addressing itself in Chicago. In the Western States, where they thresh so much grain, the owners of the threshing machines have a cook tent, with a man employed to do the cooking, and outside of the regular machine hands each man brings his own dinner. They call themselves "the tin-pail brigade." Now, why cannot farmers here adopt the same plan? Another thing in boarding help on the farm, both male and female, outside of the extra work it causes, and that is not to be ignored by any means, nor is it one of the little "foxes" by any means, but just consider it as a big old fox, capable of adding a great deal to the mischief. In boarding your help you have persons continually in the family circle not interested in your gains, losses, etc.; there is sure to spring up a restraint among the members of your own household about conversing, as they would. and sooner or later conversation drops and meals are eaten in silence. We all know that every family consists of a "ways and means" committee. We want to talk about our plans, our finances, and so many things that are of no earthly interest to anyone else; but we do not wish the outside world to know all about our little economies. and yet the ever-present somebody else prevents us from talking about these things; then in a short time silence reigns supreme. The children are in school, they go to entertainments, they meet people everywhere; the husband's business takes him away from home, he sees new faces every day; the wife cannot go to these things and do all the cooking and other work that falls upon her shoulders. Comment is unnecessary. The awful loneliness and overwork adds its share to the overwrought brain in all too short a time.

Unexpected Company.—Let the farmers' wives set the example, and resolve that, unless to make a friendly call, we will notify our friends when we wish to visit them, if it will suit. No doubt, many times they are caused no serious inconvenience, but often it is otherwise.

Our friends are like ourselves—have their work planned for the week; and I have been told by persons of experience that they had been caused embarrassment and positive financial loss by having a lot of unexpected company, where, if they had known of the intended visits a week beforehand, they could have arranged their work accordingly and had a pleasant time.

The habit of so many persons sending their children to spend vacation with country relatives.—I have heard so many say: "Oh, I do dread vacation." Just give notice that Aunt Martha is going to take a vacation this year.

There is another nuisance that comparatively few families in the country escape. A class of nomadic people that loll in the shade all summer. then travel around hunting cousins through winter. Of course, Aunt Martha must cook and wash for them. "All the labor is for his mouth, and yet his appetite is not filled." (Ecclesiastes, vi, 7.) No doubt, many present will contend that this is just an imaginary state of affairs, and cite you to different farmers where the wife has just as much leisure as her sister in town. We admit that we can find a few of that kind. I am speaking now of the great mass of farmers' wives—the one to whom life is a struggle. I am pleading for the lives of the great majority, and will let the minority take care of themselves. But why should we multiply words? The things mentioned are only a preface to one chapter of the life of too many of our farmers' wives; and yet, by a few changes suggested, there would be in a short time a better condition of affairs. Arrange everything as conveniently as your means will allow to save steps in housework; then let your wife have all the time and pleasure she wishes to take care of the little home nest, keeping it cozy and neat, caring for her dearest and best loved, without being a drudge and a slave for a lot of people nothing to you. Your wife will be a better companion, have more time to read, keep pace with the education of your children, have a greater influence over them for their souls' eternal welfare. The trend would naturally be towards more refinement in the home, and in a few years the contrast between country and city homes would be a thing of the past.

THE SOCIAL STANDING OF THE FARMER'S WIFE, AND HOW TO BETTER IT.

BY MRS. JOHN HOLMES, DELPHI.

[Read before the Carroll County Farmers' Institute.]

The word social is defined as relating to society, or to the public as an aggregate body, and shows the connection as to social duties, social interests or concerns and social pleasures. "Yes; but I have no time for society or pleasure," says someone. Where one has to prepare three meals a day and three hundred and sixty-five days in the year, besides washing, ironing, baking, sweeping, dusting, making and mending, there is not much time to devote to anything else. That is all true enough, but look how the farmers' wives did a hundred years ago. Not only all that have been mentioned, but many more, and the day then, as now, was only from sun to sun. They not only made the clothing, but raised the flax, spun and wove it. Now we have a number of machines to lighten our labor, and if we so desire, can purchase almost every article of clothing all ready made. They spun and wove all the blankets and woolen material used. Now that is all done by machinery. Soap for both laundry and toilet was made by them; also candles. We have not even seen for years any of the latter articles, much less made them.

The care of milk was part of their work. Now we have our creameries, separators and patent churns and many things in connection therewith that lighten the work, and thus affords more time to indulge ourselves in some kind of recreation. Think how they had to prepare their fruit for the family supply. Drying it was almost the only way, as the self-sealing jars or sealing wax was not then thought of. As sugar was then only made of maple sap by those who had sugar camps, or very expensive if purchased, they only prepared preserves and sweetmeats for festival occasions. Perhaps it would be quite as well for us if we did not have so much, but they add to the looks of one's table, and that is a source of great pride to every farmer's wife, and so tends to promote good feeling and sociability when a neighbor drops in to take a meal with one. Then the cooking was all, or nearly all, done by the fire-place or the outdoor ovens. Now we have wood and coal heating stoves, wood and gasoline cooking stoves, with their many ways of lightening the work of the farmer's wife. Then, they helped in many ways to clear their farms and build their houses. Think how much energy, both muscular and mental, to go through the daily routine. Could we take up the duties of the women of one hundred years ago? We are not fitted for it, and could not if we would. Our place is made for us; let us try, with our advantages, to fill them as well as they did theirs. What are the social duties of the farmer's wife? They are just what we make them, good, bad or indifferent. When one desires to be selfish, there is no better place to indulge these traits; but where one is whole-souled and genial by nature, farm life presents a wide field to cultivate such qualities. From some cause or other the idea has gone forth that the farmer and his family are to be pitied, because they are out in the country where there is no society. I have been told by one who knows that the mother of our present Governor's wife opposed the match because he was a "farmer," and said to her: "I suppose the next thing we know you will be riding into town on a load of pumpkins." The mother did not live to see her daughter the leading lady of the State, but we doubt not she was as proud and happy to be a farmer's wife, as since the new honor has become hers. Of course, we will not all be called upon to fill the highest positions, but our niches are made for us, and we can fill that particular place, perhaps, better than someone else. While our social opportunities may not present themselves so often, it is not so much what we have as what we enjoy and profit by that makes life worth living. One thing that has a tendency to make life on the farm seem to be so selfish is that, as a class or family, they are so complete within themselves. They do not have to go camping or to the seaside to find a cool and shady place; do not have to depend upon someone else for fresh fruits and vegetables, and this enjoyment of one's own vine and fig tree has earned for them the name of "moss-back" and "hay-seed." Within the home circle we have reading and music, and the study of these will place us higher in the social scale when we mingle with our friends and neighbors. Hospitality as dispensed by the "farmer's wife" seems to be a better way of improving the "social standing" than the afternoon and evening receptions of our city neighbors. Agencies which create a taste for reading good literature and stimulate the habit of occupying the leisure moments in study are commendable. This will lead to an interest in our schools, "reading circles," "farmers' clubs," our township and county institutes. As for farmers' clubs, we know whereof we speak. The Leatherwood Mutual Improvement Society has just passed its first mile-stone, and the benefit derived from it, both mentally and socially, cannot be estimated. The workers from abroad have labored faithfully to awaken our people to an appreciation of their positions as "farmers' wives," and if we take heed, we will be benefited thereby and the social standing placed on a higher plane. Visitors from abroad may not know it all, but they know some things much better than we do, and it will be no detriment to us to listen to their papers and talks on given subjects. Shakespeare says: "The fault, dear Brutus, is not in our stars, but in ourselves that we are underlings." Good roads is a feature in the promotion of sociability, and the farmer's wife can and will enjoy and appreciate them better than anyone else, for she is then enabled to attend religious services, exchange courtesies among her neighbors, attend to her marketing and in many ways add to her comfort. Free delivery of the mail is another way, and the wives should insist on our Congressman using every means in his power to enable the farming communities to enjoy the same privileges afforded those living in the cities. Another thing the farmer's wife should insist upon is the telephone, and it seems, in this day of competing telephone systems and cheap wire, there is no reason why every community should not have a system of interchange, complete and inexpensive. It has been tried and proved in some localities. It is said to be like tile drainage—once started, all fall into the scheme. Social pleasures are something of which all should partake. It is a mental condition and the result of mental culture. As the mind varies in character and degree, so may pleasure vary; the higher the order the more there is in life. Another great feature of sociabilty is the equality among them, or at least, there does not seem to be such a strife among the housewives to have something finer than her neighbor, but should one chance to obtain an article the rest have not, they all share in the pleasure of the owner, and still good feeling continues. There are many who think there is no dignity in being a "farmer's wife," and the labor performed by them degrading. To such we say "they are beneath the acquisition of dignity." Then, while we are seeking means of promoting our standing socially, let us not forget that we belong to the grand old State of Indiana, and are the wives of the tillers of the soil. Boast of the fact, and hold the head high, and show that we love to mingle with them, and in this way, with the suggestions offered, we may better the social standing of the farmer's wife.

DUTIES OF A FARMER'S WIFE.

BY MRS. ORION PEED, OAKLAND CITY.

[Read before the Pike County Farmers' Institute.]

When men go a-wooing we think it very important they choose their partners judiciously (of course, they have the choice). The minister, lawyer, and so on down the line, how often have we heard it said that man would be successful in his calling in life if it was not for his wife. Now, dear sisters, we do not want to give any of you a curtain lecture, neither do we wish to hold the men under our thumbs (but some of them would be better off if we had them there); it is the desire to bring before the institute the duties of a farmer's wife in such a manner that might lighten the burden of many who are cumbered about with many things. How many are the duties of wives in this broad land of ours to-day? Although the duties of a farmer's wife are almost without number, we may in this simple paper call to notice the duties of wives of men in other pursuits of life, and perchance it would have a tendency to give cheer to some who may think their duties greater than their sisters. We are willing to bear criticism, and do hope to receive it in a friendly manner if we should exaggerate in any way, and we must call to notice that some of our sex do that sometimes when we speak of the many duties we have to perform, forgetting that the men have their share of burdens, also, and vice versa.

The first essential duty for a farmer's wife is to have the farmer, the farm and the home built; then what is any nearer paradise in this world to begin with? It is very necessary that the wife have a love for the life she is to lead. We do not think it any more essential that the farmer's wife should know how to plow or to reap (unless she be the farmer) than for the lawyer's wife to be able to plead his case in court; but in lighter work we think it no sin if she lend a hand, if the time is to spare and the case demands it. The desire of all wives should be to make home just the place God would have it be, where our children can grow to be useful men and women. How many of our farmer women think it not their duty to beautify their homes, but constantly desire to buy more land? When our country women open their eyes and realize how they can happily educate and promote the best interests of their children by reading good books and music in their homes, perhaps there would not be the tendency for the boys to go to town and the girls marry a dude. Women always have been reformers, and if we want our burdens lifted, we must in a measure do it ourselves by letting go of many things which our grandmothers did. The men are constantly improving in their methods of work. Can we not be as progressive as they? We do think it a duty of every farmer woman to have at least one magazine in the home from which she can gather useful knowledge and by which she can fashion her and her daughters' dresses, that when they go to town they may not be the subject of ridicule. Am sorry some women have not the money to subscribe for one. We earnestly desire that every farmer in this institute subscribe for some good ladies' magazine for his wife a Christmas present, and try the effect it will have on her. How often has it been said that charity begins at home, and how often it never leaves there! We think each one owes something to their neighbor by sharing in their joys and sorrows as well. There are a great many demands on farmer women to contribute to church socials, and we believe it is a duty to contribute according as God has prospered us, if that be but a kind word or a smile.

Dear sisters, as the short days are now upon us, let us plan some evening amusements. It will encourage the children and make our husbands feel young again. In fact, it is a duty to be young in heart, though our hair be streaked with gray and our form bent with rheumatism. The winter is the time to look after the clothing and general household sewing, not waiting till spring ushers in such an endless amount of work that our tired brains and aching limbs are in no condition to enjoy the loveliness of nature. Let us use more thought in our work and less elbow grease. Both are very necessary to the farmer's wife when used in harmony with each other. Can we not get a few labor-saving contrivances that may lighten the many duties we have to perform? In fact, we know that many of our women are awake and know that they must save strength. One way of saving strength is teaching the children to do what they can to keep the household machinery in motion.

Let us put all the cheerfulness and sunshine in our homes possible, and perhaps the men will not loaf at the village store so much. Contentment and economy are two very important things in family life. There are many families in exactly the same position in which the old prophet prayed to be, having "neither poverty nor riches." It is the wife, as a general rule, who regulates the expenditures of the household and manner of living, to which much thought should be given. We should like to speak of some of the duties of husbands, for it must not be forgotten they have some duties that are important in household affairs; but it appears from the subject that the woman is the one to whom the encouragement and advice must be given, and it leaves us to suppose she is the main factor in the partnership. If the wife is contented and happy, her husband is likely to be.

Don't look for the flaws as you go through life:
    And even when you find them,
It is wise and kind to be somewhat blind,
    And look for the virtue behind them.

THE WIFE'S PLACE ON THE FARM.

BY MRS RUSH DAVIS, CARLISLE.

[Read before the Sullivan County Farmers' Institute.]

Since I fully appreciate my inability to fill this place, I assure you the task of preparing an article outlining the duties of the farm wife is far beyond my capability. Yet, poor as my effort has been, I pray you to be lenient in your criticism, remembering it is only the production of one who has fallen far short of the ideal farm wife. You will all agree with me in so far as I make the assertion that the farm wife is not supposed to possess a set of attributes different from any other wife, but that she must possess all those marks which characterize her as the molding principle of the farm family, as she is in every other family, the carving, shaping, guiding factor, blending all things of the social phase of the family to her standard. No special duty can be assigned the farm wife; therefore, there is no necessity of her having qualifications not given to others. Yet I do think that she must emphasize some attributes of her life more than others. The necessity of cultivating contentment cannot be too deeply impressed.

Contentment of the farm wife is very essential, if she would have the best results, because it is the bridge which oftentimes spans the dark places, and is therefore the means whereby the weary pilgrim may often pass into bright fields across the water of solitude. "Farm drudgery" or isolation from friends. How often do we hear the expression from some lonely farm wife, "Oh, how I hate this weary, monotonous life." To such a one we extend our sympathy, and feel that this is but the reflected thought of many farm wives when darkness enshrouds all and chaos is king, when the realization that we are debarred of lectures, pleasures, church advantages, societies, etc., yet when such pleasures are ours we think we appreciate them in a tenfold degree, because 'tis the bitter mixed with the sweet, even though our city sisters do assign us the triple crown of country jake, green horn, hay-seed. Contentment is the willing hand given to help bear the load of trouble, the aggregate of many petty trials of the husband, and oh, how much lies in her power here, of thus sharing the burdens of the overworked and oftentimes discouraged breadwinner, who returns to his home at night, the one place in all the world where he should find new strength and new courage. Then it is that the contented wife, who, doing her duty, is after all the strongest factor in the final victory; she who waits, works, guards and guides the little flocks, is the bravest. Contentment paves the way to common interest, and you may rest assured that selfishness nor indifference can ever thrive where common interest is king. And when the wife feels and exercises an interest in the farm, she is and has a right to be consulted in every detail of the farm, though it be the purchase of a plow, binder, stove or breed of poultry.

'Tis common interest which leads the wife to take the basket of corn to the hog-pen or the milk pail to the cow-pen, with as willing step and as accurate knowledge of the kind of work to be done there as she would grace the parlor or kitchen.

As we trace the thread of the farm wife's duties we find it leads us to another all-important thing, viz.: Keeping the home always attractive and enticing. This can be done in no other way than by a perpetual, ever-watching of all corners, having a place for everything, a law our good old grandmas saw fit to hold as almost sacred. This does not mean, however, that a straight jacket must be the doom of every article in the house, with the instructions to the children "that mamma'll whip you if you touch it," but the happy medium of allowing freedom of the home to the children, being careful to lead them to see that economy and regulation are essential to happiness.

Too often we see the lack of personal pride in the farm wife. She has the wrong idea of economy in her clothes; her garb is too often of a very sloven style, being armed with the false excuse, "nobody sees me." Where are the husband, the children, the passer-by?

Another indispensable essential of the wife's possessions should be her desire and qualifications to help outline the education of the children; she must know and feel it to be true that the mind must be fed as well as the physical body. In order that this may be accomplished, good reading material should be in every home. I think that any home cannot possibly be tending toward the ideal one without good, clean, bright, instructive, helpful books, papers, magazines, etc., and I am very fearful that this part of the farm life is sadly neglected; and this is a serious, as well as dangerous, error. To starve the mind is equivalent to feeding all our penal institutions.

On the farm one comes in direct contact with nature in every form, both the animal and vegetable kingdoms; and why should the wife not be as close an observer of nature as the husband—thus becoming familiar with all of "nature's visible forms," and also of their habitat?

If she be a close reader of nature, think of the thousand devices nature affords her to make the farm home the most interesting of all others! Look, sisters, at the advantage we have over our city sisters in the way of listening to Nature's teaching!

'Tis a well understood fact that the farm wife appoints herself physician at large, since she and her family are so situated that free access to a competent physician is impossible, and his advice is oftentimes denied her; therefore, it is doubly essential that she be familiar with all antidotes for the many common ills the flesh is heir to.

Woman's place in the financial phase of farm life is as far-reaching as the other duties given her. Besides the advice she may be able to give the husband in the larger deals he makes, there are countless schemes she may be able to concoct to secure the many little things for the house, filling each corner and crevice with those little things which make the home attractive to the eye. And here, again, is a mistake often found on the farm—the wife doing without many conveniences she might possess because she thinks they are not able to afford them, when, nine times out of ten, when they are able to get them, she is ready to die or too old to enjoy them.

No doubt many in this hall have heard the remark of a farm wife—"Oh, I can't have anything decent in my house." The husband puts in all on the farm or in stock, as the case may be. Or the husband will say: "I cannot improve my farm, or buy necessary farm implements, because the wife puts it all in the house or on her back." In such cases I would say, equalize the proceeds. Here is an example of how many heavenly homes on the farm manage their finance: The husband takes the proceeds of the cattle, hogs, sheep and grain to improve his farm, pay debts, taxes, etc., while the wife gets that of butter, eggs, chickens and turkeys, etc., for the house, thereby yielding her pleasures gotten in no other way, because the purchase was made with her own money; and then it makes one feel so independent to not have to ask for every penny—not fearing of being denied, but most women hesitate to ask for money.

There is the cooking, sewing, washing, ironing, churning, mending, sweeping, etc., which may or may not be classed in the drudgery line, as one has a mind to emphasize this part of the life; for every vocation has its drawbacks as well as its pleasures, and the farm life is not excepted. But we feel its pleasures far outnumber its vices and inconveniences, for when we contrast the purity of farm life to the vileness of city life, we bow in humble thankfulness the lot is ours to be in nature's broad domain of purity, health, happiness and independence. The time has long since passed when music, literature, art and all the higher refinements of life are confined to the city homes; but we now see our farm homes as well equipped with such things, and I beg you not to think me inconsistent when I say the strong personality of the wife has a greater tendency to bring all these conditions about more than anything else, for if she be a far-sighted person she will see the inevitable results of such a manner of rearing her children, as a well developed, well balanced character can be but the result of such training—as the wife's place on the farm is as the meal given to the weary traveler who, going into the restaurant, tired, discouraged and with a beastly appetite, when asked by the porter what he desired, replied: "I am so hungry I will take a little of everything you have." Imagine his look of surprise when a dish of hash was brought him. Yes, the wife's place on the farm includes, as the dish of hash, a little bit of everything. Yet I thank God to-day I am a farmer's daughter and a farmer's wife.

SANITARY CONDITIONS OF A FARMER'S HOME.

BY J. S. MARTIN, M. D., PLYMOUTH.

[Read before the Marshall County Farmers' Institute.]

Life, of itself, in all its variable forms, with its blooming health and vigor, is the very beauty, the very soul, of creation—the world's greatest marvel, its deepest mystery. The farmer, practically, has more to do with life, both vegetable and animal, than any other person. On a bright spring morning he goes forth to the open field for the labor of the day. The dewy grass beneath his feet is sparkling with life, the trees are clothed with their new verdure of green leaves, his orchards are sending forth their sweet odor of spring flowers; the little blade of corn, around whose roots he throws the mellow soil, is fairly dancing with life and freshness; the green fields of wheat are waving before the morning breeze in hope of a rich harvest now at hand; his cattle are grazing in the pastures, while the warbling songsters in the treetops and the bleating lambs in the fields fill the air about him with the sweetest music of life. The fields and woods around him, the rivulets and brooks that meander through them, the old hills and prospect of country held out to his view, the very sunshine and blue sky above him, and the fleecy clouds that float in midair, all speak a language of life and glory, such as on the morning of creation, "when the new-born stars sang together and the angels of God shouted for joy."

Although a life of sweat and toil, no other occupation affords such delightful intercourse with nature as does that of the farmer. As to the origin of life, or what life is, he knows or cares but little. Indeed, he knows as much, and can give as good a definition of life as Huxley, Darwin and all the great scientists of the day, who have spent years in determining whether life is a chemical process, an evolution of matter, a force of circumstances or a spontaneity. The truth is, no chemist or scientist can define it. While all are familiar with its manifestations, its essence is enveloped in the deep mysteries of creation. It comes from God alone.

Death is opposed to life and constantly warring against it. All things are subject to decay and death. That which can most effectually resist these destructive elements will survive the longest. It is then a matter of supreme importance to know how to resist death and preserve life, especially that life which is most valuable of all—human life. As a body of farmers, in convention, you are very appropriately discussing the best methods of preserving and promoting vegetable and animal life. You talk about selecting and protecting the seed, which preserves the germ of life, how best to promote the growth of the tender plant and save it from the blights of the season, and the insects that are constantly warring against it, so that it may be preserved until the purpose of its existence shall be fully developed, and the best results secured. So with the domestic animals around you. How interested and eager to listen to all the discussions as to the best stock, how to care for the young and protect them from disease, what to feed and what not to feed, how to obtain the finest hogs and sheep, the best cattle, the finest horses. You are intensely alive to all these points, for that is your business. You are continually fighting that which would destroy and kill.

No class of persons has so much to do to promote life as the farmer. I am not warranted in saying he is not equally interested in the preservation of his own life and health, and that of his family, as he is of his cattle and horses. As a body of intelligent farmers you would be insulted if I should insist you were not. There is no study so important as that which teaches how to possess health and human life. Hygiene is the coming science. In the face of all the many valuable improvements and inventions of the day, by which mankind has been so richly benefited, and the abundant promise of what may yet be done, I will venture to assert that in this will the greatest advancement be made; and the most good to be done to the race will be through the promulgations and teachings of hygiene and sanitary science. It is needless for me to say how important is the life of a child to its parents, or the life of a father or mother to the child. How valuable are a few years of existence added to the life of an individual, after having made a thorough preparation for some great work. After any of you, as farmers, have toiled and sacrificed in your early life to secure the comforts you now enjoy, surrounded with the opportunities of making money easily, with your farms under good cultivation and out of debt, how important to yourselves and the happiness of your family and friends is the practical use of any knowledge that would add to your life ten, fifteen or twenty years. How often we hear the sad remark, that such an one was taken away just as he was beginning to live with comfort. This is what sanitary laws and science are doing for the race.

Notwithstanding the downward tendency in the life of man, by increased strain on the nervous system, growing out of an advanced civilization, yet within the last quarter of a century it is estimated that people live, on the average, ten years longer than they did formerly. This is mostly due to the practical use of advanced sanitary knowledge, and I may modestly, but truthfully, add through the benevolent efforts of the medical profession. As the crowded cities and towns, where the people thickly congregate, have been the principal abodes of sin and death, these improved sanitary regulations have been directed to them. But little has been done for the country as a pure sanitary measure. It is true the draining of our swamp lands and the use of driven wells have vastly increased the general health, yet these have been done more for profit than for health.

The country is supposed to be the abode of health, and the town and city for sickness. This is undoubtedly true. We have no perfectly reliable data to determine the relative value of each; yet, from my own observation, and the opinion of several physicians, whose life-long practice has been in both city and country, and from statistics, I am inclined to affirm there are more days of sickness in the country than in the city. This may be on account of better health regulations in cities, for certainly the country, with its pure air, its quiet, peaceable occupations, has the advantage for health.

And now let us, in a practical way, discuss this question now before us, ignoring as far as possible scientific terms and illustrations. Sanitary conditions affecting the health of a farmer are no different from those affecting any one else. His relations to them may be different. The laws of good health are the same everywhere. Wholesome sanitary conditions consist mainly in pure air, pure water, pure and wholesome food in proper quantities, and pure and appropriate medicines when sick. These are ingested articles. Then, as to outside circumstances, cleanliness of person, protection from exposure, regularity of living, systematic industry and relaxation, with composure of mind, and, I might add, a good conscience. These might be summed up in three words—cleanliness, temperance and industry.

Who has better opportunities of appropriating all these conditions mentioned than the farmer? Can there be better air than wholesome country air? Better water than the pure water of the country? Better food than he provides for his table, fresh from his own productions? What, then, is the cause of so much disease, broken-down health, among farmers and their families? Now, I do not wish to discriminate against the farmers. My observation teaches me that the farmers of Indiana are equal in intelligence, socially and refined habits of living, to those who dwell in the cities. If some plain things are said, just take it as information received about your neighbor. A good lady much given to gossip once said in the presence of her husband, "How true it is that one-half of the world does not know how the other half lives." "Well, my dear," replied her husband, "if that is so, I am sure it is not your fault." And so I say, if you farmers who attend this Institute do not know how the farmers live who do not attend, I am sure it will not be my fault.

The best hygienic science of the day tells us that the impurities of the water people drink and the air they breathe are the prolific source of the great majority of the fatal diseases of the country. What, then, contaminates the air and water around a farmer's house? I answer, the same as everywhere—filth. Well, what is filth? I might express my idea by making use of the familiar scientific terms, as microbes, micro-organisms, bacteria bacillus, sperms, spores, etc. I prefer to use the plain, though offensive, Anglo-Saxon word—filth. It is the most forcible. It means, in the original, putrefaction. We use it to express anything unclean, dirty, forbidding, defiling, disgraceful—any kind of dirt or offensive rubbish. Anything that is thrown around our habitations, dirty water of every description, from that in which food is cleaned to dishwater and slops of every kind; dirt swept from the floors, the contents of a wood-box, the refuse of a wood yard lying under the floor of an old wood house or summer kitchen, or near the back door yard, from year to year; that of the hen house or piggery, the excrements from chambers and privies, feather beds, woolen blankets long in use without renovating, musty rooms—all emit a filth. All sorts of rubbish, if allowed to stand, becomes filthy, and dampness increases it by causing fermentation. These are the impurities that enter the air we breathe and the water we drink, in a variety of ways, and give rise to the disease-producing elements.

The most dangerous filth comes from the human body by the various excretory organs, viz.: Lungs, skin, kidneys and bowels, which are throwing off the waste material of the system. We live by constantly wasting and renewing, and, if either of these processes are interfered with in the least, our bodies become diseased. The nose is the organ that tells us if any of this waste material is lying around; whether in the close, unventilated sleeping room or the contents of the adjoining privy, or the waste products that are carried about the person, from the odoriferous feet up to the catarrhal stench which is frequently met with in well-dressed ladies and gentlemen. This excrementitious waste of man or animal has no right to exist in contact with the living body. It is a part of the same substance that composes the dead body which we take such pains to bury out of sight. It has been demonstrated beyond a doubt that the modern civilized privy, and the barn yard, with their filth, polluting the air around a farm dwelling and leaching their poisons through the strata of earth to the adjoining well, together with the effluvia arising from decaying matter and slops thrown from the back kitchen door, and that from ill-ventilated rooms within, are the sources of 99-100 of all the cases of typhoid fever and nine-tenth of all coughs, colds, sore throats and fevers of all kinds. Of course there are other factors that enter in as the cause of these diseases, still they would be as fire without fuel if this did not exist. Typhoid fever is found to be peculiarly a disease of the country. It prevails in rural districts. Prof. Vaughn, of Ann Arbor University, says that not a single case of typhoid fever need be if all lived under proper sanitary regulations. It is a preventable disease. There is a saying that for every death by typhoid fever, some one ought to be hung. Of course you all know that it should be the doctor for letting them die. They say that is the way they serve the doctors in China. There are about one thousand deaths from typhoid fever every year in Indiana. If we had a law that would choke up the old fellows at that rate, it might be considered a good sanitary measure. You would get rid of them faster than Chicago could turn them out. But before they allow the noose to be put around their necks, they will show up where the blame belongs. The old settlers will remember how this fever used to prevail when the country was new, the wells shallow, with wooden curbs and drop buckets. Several of these still exist in Marshall County, where the contaminated surface water is still imbibed. The bucket is not all that is attached to the rope. Let me tell you how the old oaken bucket was robbed of its romance by one who analyzed its contents and then wrote a parody on it with these lines:

With what anguish of mind I remember my childhood,
Recalled in the light of a knowledge since gained;
The malarious farm, the wet, fungus-grown wildwood,
The chills then contracted which since have remained;
The scum-covered duck-pond, the pig-sty close by it,
The ditch where the sour-smelling house drainage fell;
The damp, shaded dwelling, the foul barnyard nigh it,
But worse than all else was that terrible well,
And the old oaken bucket, the mould-crusted bucket,
The moss-covered bucket that hung in the well.

Just think of it! Moss on the vessel that lifted
The water I drank in the days called to mind,
Ere I knew what professors and scientists gifted
In the water of wells by analysis find:
The rotting wood fibre, the oxide of iron,
The algæ, the frog of unusual size,
The water impure as the verses of Byron,
Are the things I remember with tears in my eyes.
And to tell the sad truth, though I shudder to think it,
I considered that water uncommonly clear,
And often at noon when I went there to drink it,
I enjoyed it as much as I now enjoy beer.
How ardent I seized, with hands that were grimy,
And quick to the mud-covered bottom it fell;
Then reeking with nitrates and nitrites, and slimy
With matter organic, it rose from the well.

Oh! had I but realized, in time to avoid them,
The dangers that lurked in that pestilent draught,
I'd have tested for organic germs and destroyed them
With potassic permanganate ere I had quaffed;
Or perchance I'd have boiled it, and afterward strained it
Through filters of charcoal and gravel combined;
Or, after distilling, condensed and regained it
In potable form, with its filth left behind.
How little I knew of the dread typhoid fever
Which lurked in the water I ventured to drink;
But since I've become a devoted believer
In teachings of science, I shudder to think.
And now, far removed from the scenes I'm describing,
The story for warning to others I tell,
As memory reverts to my youthful imbibing,
And I gag at the thought of that horrible well,
And the old oaken bucket, the fungus-grown bucket,
In fact, the slop bucket that hung in the well.

I fancy I hear some good practical old lady, who has reared a large family of healthy sons and daughters on the old farm in the old-fashioned way, exclaim, I do not believe in your new fangled notions. Well, that may be true. All do not succumb to these deleterious influences. Nature has provided us with a certain amount of resistive force to throw off approaching diseases; yet many yield. Think of the long list of deaths from these fevers and the many days of sickness that have marked the course of the early settlers of the country, and then notice the improvement since people are regarding sanitary measures. Besides, these notions are not new. Read the law of Moses on purification as given by the Almighty. How specific are these regulations which enforce pure air, pure water, pure food and thorough cleanliness of the person and habits in all the domestic and sexual relations of life. Why our most advanced sanitary laws do not come up to this standard. The laws that govern the health of the body in every minutia are as strict and as binding in the Divine command, as those that govern the soul's salvation. In fact they are inseparable.

What can a farmer do to protect himself from these influences? First, he must look after his home. His house must be on pure soil, and if possible, on an elevation from which the natural drainage would extend in every direction, and surrounded with a sufficient number of trees to protect it from the natural exposure, and no more. The cellar, the most important room in view of health, should extend under the whole house, for one of the most fruitful conditions to develop consumption is a house on damp ground. It should be constructed to keep out dampness, for it is a damp cellar, with damp walls, that cause musty rooms above, that emit such an unpleasant, unhealthy odor. If you are building a house on damp soil I advise the excavations for the cellar to be made fully one foot beyond the outside of the wall, and after the wall is built, the space filled up with gravel and cement. This will keep the cellar dry and prevent the rain-fall from moistening the walls. The cellar should be well ventilated, the floor cemented, and walls whitewashed. It is absolutely barbarous to allow anything to decay in the cellar. If it is to contain a furnace, that should be in a separate room with communication with the outside air, that the heated air in the rooms above would be pure. Great care should be exercised in the ventilation of all the rooms of the house, especially the sleeping rooms. Time will not allow me to stop and go into detail on the subject of ventilation. It is of sufficient importance to engage your study and practice.

What shall be done with the garbage from the kitchen and refuse from the table? Give your apple and potato parings, cabbage leaves, etc., when fresh, to your cattle, but not to milking cows; the refuse of your table to your chickens. Burn up what they will not eat, and be sure to carry all washing slops and dirty water to a fresh place distant from the house in the bright sunshine, where it will quickly oxidize with the surrounding atmosphere and be harmless.

What shall be done with the contents of the earth closets? This is the most important question affecting the health of a farmer's family. Use the dry earth system. It is the best disinfectant. Arrange the privy vaults in some way that you can freely mix with dry earth and remove the mixture to some remote field as an excellent fertilizing agent. The same may be said of the offals from chicken coops, pig-pens, cow and horse stables. The compost heap formed from the daily cleanings of the above, and each morning covered with dry earth prepared for the occasion, would amply pay the farmer for the extra trouble and expense in the increased fertilizing qualities of these offals, not to mention the source of satisfaction in the cleanliness of these surroundings, while the health afforded to his family in the purity of the products of the dairy, the piggery, the chicken house, the water they drank and the air they breathed, which such a system would bring, is too valuable for calculation.

To get pure water, abandon the open well for the drive well. Good, pure cistern water is essential. The cistern should be built with a stone wall 18 inches thick, well cemented both inside and out, not only that water should not leak out, but that it should not leak in. The water let in should be well filtered. Too great care can not be exercised in keeping the kitchen, where food is prepared and eaten, clean. A lady may keep her house in excellent order, her furniture well arranged, tasty and dusted; she may have snowy, white spreads and beautiful ornaments in every room, but be not too lavish in your praises upon her housekeeping until you have examined her kitchen. Call not that man a good farmer, however well his fields and fences may be in repair, if he allows rubbish and filth to accumulate around his premises. What are "clean premises?" It includes a clean street, a clean front yard, a clean backyard, a clean, ventilated basement and cellar, pure air in the living and sleeping rooms night and day, pure water for all domestic uses, the free use of disinfectants, and the frequent service of broom, rake and match.

It has been discovered and proved that the source of malarial fevers of all kinds, as intermittent, remittent, bilious and slow continued fevers that farmers' families suffer a great deal from, are due to a microscopic vegetable growth with rootlets, called a bacillus—a little rod, because the vegetable, highly magnified, looks like one. It is the result of vegetable decomposition, and is found most abundant in soils rich in vegetable mold. If there is a growth of vegetation upon this soil this bacillus can not thrive, but if this soil is barren and exposed to the sun and rain, these bacilli become abundant, and when the soil is stirred they rapidly separate and are carried by the wind in all directions. We breath in these micro-organisms, and if our physical system can not resist their influence, we become stricken down with these malarious fevers. A most fruitful source of them is a rich, summer fallow. Take a piece of ground containing a growth of clover well manured, plow it under in the early part of the season, let the sod rot and become a rich mold, then keep it stirred well until seeding time and allow no vegetation to grow upon it and you can get an abundance of that material that calls for so much quinine to antidote. If possible, do not have any rich soil stirred during the hot season that contains no vegetable growth.

I can not stop to discuss the foods for a farmer's table essential to health, although it too is important. As for me, a farmer's dinner well gotten up is about as good as I want to partake of. I have some objection to the way the average farmer eats his meals, but perhaps no different from the man in town. He comes to his breakfast or dinner in a hurried manner after a fatiguing exercise, with the blood warm and the capillaries of the stomach engorged. He is hungry, he eats fast, and does not wait to slowly masticate his food that it may be thoroughly mixed with the saliva so essential with good digestion, but washes down his hot biscuit, his fried pork and mince pie with his coffee, then gets up from his table and hurries around to attend to some chores before entering upon his regular labor, leaving the stomach no chance to rest. Soon he becomes dyspeptic and flies to some patent nostrum for relief.

Human life is greatly shortened from errors in eating and drinking. Many days of sickness come to the farmer in general from the practice of getting up early and being out at work in a malarious atmosphere an hour or two before breakfast. If he must go before the regular breakfast, he should have a cup of hot water and a little simple food upon his stomach. Happy is the person who can so arrange his diet that he has no unpleasant reminder after. It will amply repay him for all the self-denial he may practice to obtain it. Personal cleanliness is another important item of health for the farmer. His work is in the dust and dirt. This is necessary. The pores of the skin become obstructed and their valuable functions interfered with; and right here is a frequent cause of kidney and lung troubles. An entire change of clothing at night when the day's work is done, and the skin well rubbed with a dry, coarse towel, or at least once a week bathed, would amply repay the farmer in dollars and cents. In opening the outside clothing of any person, farmer or otherwise, who seldom or ever attends to this duty, and placing the ear next to the body to listen to the action of the lungs or heart, the doctor's olfactory organs get such an odoriferous salute that it will stick to his memory whether cherished or not.

Systematic industry and relaxation is necessary to the health of the farmer as it is to any one else. I should like to ask any intelligent farmer if it is not possible to reduce all of his operations on the farm, at all seasons of the year, to as much regularity as the manufacturer?

Must a farmer or his family of necessity shorten their lives by working sixteen hours a day instead of ten? He should have his regular periods of rest and relaxation or his health and that of his family will suffer. I know one large farmer who did this, and he was always ahead of his business and was successful. The farmers' social gatherings that are now becoming frequent, are the best promoters of health; especially is this the case with the farmers' wives. Woman by nature loves sociality. When she is deprived of it, and remains at home at the ceaseless daily routine of caring for a family, the mind becomes morbid and she breaks down in health and spirits. These conditions predispose to a long train of nervous diseases and morbid mentality, in many cases insanity ensues, and for this reason we find a large percentage of the inmates of our insane asylums are taken from the farmer's home. To obviate this sad tendency the farmers' wives need more occasions for social converse. Public gatherings of women for various purposes, religious, social and otherwise, are becoming popular, but these almost wholly affect the residents of cities. Whatever may be said of the town lady as a gad-about, surely this accusation does not belong to her country sister. On first becoming a resident of Plymouth, I was struck with the marked absence of sociality between the city and country people. Each had their own social circles and gatherings almost wholly exclusive of the other. It seemed to be that the only occasion of coming together was purely a business relation. This is not for the health and comfort of either class. Once in a while we would hear the country woman say that the city people were aristocratic or "stuck up." This is undoubtedly true in a few instances where wealth and social standing has by accident fallen to persons without sense or education. The very few persons in the country who willfully stand aloof from all city people on this account, and the few in the cities who will treat country ladies as a class with a contemptuous view, should be relegated to live in a small community by themselves, away from the rest of us, where the houses were closely adjacent, and each of the different classes be compelled to live sandwiched between one another in order to get better acquainted. While I am fully in accord with the sentiment that woman's rightful sphere is in the home attending to home duties, yet I am persuaded from my own observation that there is too much of that among farmers' wives for their health and comfort. I would advise the farmer when he is disposed to hitch up his horse to drive to town for the purpose of mailing a letter, and—and—well, etc., and have a good social time, while home affairs are of such nature that both himself and wife can not leave, that occasionally he put the reins in her hands to go and attend to that important business, while he stays at home to attend to the house and have a nice warm supper to greet her on her return. Any person who can not get up as good an ordinary meal as his wife is not more than half a farmer or half a man anywhere as far as that is concerned. My brothers, on the farm, do not keep your first wife busy bringing up the family, wearing them out in the process, that in order, when their bodies are laid away beneath the sod in the lonely graveyard, you may have the means to enjoy yourself in taking trips with your second wife visiting and sight-seeing. Go with your first wife, as many of you do, and see how much enjoyment there is in that.

In these rambling remarks I deem it important to speak of another danger affecting the health and life of a farmer, and that is exposure. Now that our lands are mostly cleared of their timber, and the cold wintry winds sweep with such force across the country, unless the farmer is clad with thick flannel underwear next to his person and wrapped in a warm overcoat when he drives, he is very apt to become chilled and the dangerous disease of pneumonia or congestion of the kidneys be produced. I have known of several strong, vigorous and healthy farmers brought suddenly to their death by this means. That farmers are in more danger in this regard than others is because they are more careless. For instance, they go to the woods to load wood or logs, or to the barn to put on a load of produce, perhaps perspire in the process, and while feeling a glow of warmth they heedlessly jump upon their loads without an overcoat, drive several miles to town, become suddenly chilled and the result is often fatal. I have known several valuable men to lose their lives just in that way.

I wish now to close this already too lengthy talk by referring to a disease of the deepest import and affecting the farmers in a marked degree. This disease that I shall speak of is not found in the nomenclature of medical science, or described in medical books, or discussed in medical journals. It has spread with alarming rapidity during the last quarter of a century, and the worst feature of it is, that comparatively few survive. Your speaker has had this disease in quite a bad form, but has been fortunate enough to recover. Many homes have been destroyed by its ravages, and very many more will soon be broken up by its increasing onslaught. It brings paleness to the cheek, wrinkles to the brow, causes father and mother to grow prematurely gray and sends them to an early grave. It produces care and anxiety by day and drives sweet sleep from the pillow by night. It brings destitution and sorrow to children and drives them out into the cold world to battle against its ravages. I know not how many, but I am convinced that very many of my hearers and their neighbors are affected more or less by this disease. I will not have time to describe to you all the symptoms of this malady such as are experienced by those affected. You, no doubt, are impatient for me to name it. It is the mortgage disease that prevails in our fair land. The sight and hearing of the word "mortgage" causes a cold chill or shudder to creep over me and the blood to congeal in my veins. But few words in the English language have a similar import. Slavery, servitude. prisoner and a few others are like the word "mortgage." They all convey the sense that an individual has voluntarily or involuntarily departed from his birthright of manly independence and is placed in a cringing. servile attitude towards his fellow mortal. The very word itself stares upon you like the human skeleton with all the stoical impudence that grim death has invested it with. For like the fatal poison in the cup of Socrates, so etymologically, death lurks in the word mortgage. Derived from the root mors or mort, which means death, it is classed with such derivative words as morgue, mortal, mortify, etc. The other part of the word, gage, signifies, to pledge, to hold, to bind, to grip. Thus literally the word mortgage means a death grip. When the judge and jury decide against the criminal, and the law places him behind prison bars, the State has a death grip or mortgage on his person. The slaveholder has a death grip or mortgage on his slave, and so the anaconda when he spirally winds his slimy carcass around you and spits his venom in your eyes and mouth, has a mortgage or death grip on your body.

Mortality itself has a death hold or mortgage on every person which needs no county records to make it sure. All things it is said are uncertain. Death and mortgages are the exceptions. The drought, the blight, the cyclone, the ravishing insect may cut short the crops of the farmer, but the interest and principal which he has to pay on his mortgage never fails to turn up. As you value your health, your comfort, your peace of mind and length of days, avoid the money loaner as you would the pest-house of smallpox. When he fastens his death grip upon you, he is above all contingencies and independent of Providence and prayers, labor and anxiety. It matters not whether he is in his office or on a pleasure trip, whether at home or abroad, enjoying the cool breezes of a summer resort, his income from your sweat and toil is just the same and is as sure as the everlasting hills. He is placed away beyond the fiat of the Almighty, when He declared that man should earn his bread by the sweat of his brow. "Though the elements shall melt with fervent heat, the earth also and all the works that are therein shall be burned up," so keen is the mortgagee in obtaining fire insurance security that I am not so certain but that there would still be a claim on your interest in the gold-paved streets of the New Jerusalem.

In a small community where resided a few villagers and surrounding farmers, there dwelt an old miserly money loaner. By constantly loaning them money at high rates of interest, he gradually had absorbed the life and substance of his neighbors and they became so impoverished that they could scarcely eke out a subsistence after paying him his yearly interest. He finally had a mortgage on all their possessions until they could mortgage no more. He took no interest in public affairs, and abject poverty and gloom settled down like a pall upon the people. The neighbors met one day in their little old weather-beaten church, to commiserate one with the other and to pray over their pitiless circumstances. With the prospect of release which death alone could bestow, and in bright anticipations of their heavenly possessions, they joyously sang, "There is a happy land far, far away." The old miser happened to be passing the open door just at that time, and hearing the singing, entered the church for the first time, excitedly exclaiming, "Land, land, where is your land? I will loan you some money and take a mortgage on it."

I do not wish to be understood as making an onslaught on the general practice of money loaning. The advanced improvement of our present civilization is largely based on the loan of money. Where it is practiced purely for business purposes, there it has its legitimate sphere, but mortgages should never be placed upon the homes of the land that shelter the inmates, except for the security of the purchase money. The wear and tear of mental anxiety accompanying them, does more to undermine the health and shorten the period of life than all the unsanitary conditions I have mentioned, and that is the reason I speak of mortgages in connection with my subject to-day. I know from experience its terrible depressing effect. Its constant consuming of your life and earthly substance is like the worm that dieth not. I speak of this because of the million dollars of mortgages resting down like a dark pall upon the homes of the farmers of Marshall County and the hearts of the inmates of these homes. Of course I advise the payment of every dollar of one's indebtedness, whether based on a simple promise to pay or on a mortgage, but in the case of the latter the exhortation is not necessary.

Let me give you an illustration that will find its counterpart in more than a score of cases in Marshall County. Here is a landholder who has lived, moved and owned the old homestead for many years. He came into this country when he was a young man, and has lived here for nearly half a century. With vigorous blows by strong arms he helped fell these great forests, and cleared these lands now teeming with the products of a rich soil. With his axe, shovel and grub hoe, he has cut down the timber, rooted out the stumps, graded down the hills, corduroyed the marshes, filled up the valleys, and smoothed the roads over which our carriages roll with ease and elegance. He has helped erect these school houses and public buildings. For all these years the church to which he has belonged has not missed his faithful adherence. But the old money-loaning Shylock has been around. Through the want it may be of a little financial ability, or a want of acquired shrewdness to steer clear of shysters and sharps, of whom many an honest farmer has been made a victim, or likely, through his generous nature to help a supposed friend by a heavy indorsement, the death grip mortgage has laid hold of his possessions. But he is no longer vigorous and strong to combat mountain-like difficulties. The heyday of his earthly existence has passed, his hard labor is done, his hair has grown gray, his steps are feeble, and his once erect form is now bent with age. But his mortgage has grown stronger while he has grown weaker. He, and his aged wife, who during all these years has been his faithful companion, now linger around the old, familiar hearthstone with gloomy forebodings of their earthly prospects. They know not but that the sheriff will soon be obliged to sell their home to strangers. They turn to the blessed book lying on the stand, so rich in consolation to the aged saint, and they read, "In my Father's house are many mansions; I go to prepare a place for you." They know that He will grant to them a free, simple right to an eternal possession to a home in that blessed land above, while they comfort their hearts in singing:

"When I can read my title clear
  To mansions in the skies,
I'll bid farewell to every fear
  And wipe my weeping eyes."

All the land they care for on the earth now is a place two by six feet, to rest their mortal remains, and no mortgage that I ever heard of cares to get his death grip on the land where rests the dead.

Call me not pessimistic, for out of these unfortunate conditions our country is soon to emerge into an era of prosperity never known in its history. It will not be on account of any political party, but rather in spite of their various machinations. As the older generations shall pass away, the younger will learn lessons of economy, thrift and industry, and the mountains of mortgages will melt away as the warm sun melts the massive icebergs. The world is making rapid strides to better and quicker methods of doing business. There will in the future be better farming, better stock on the farm, better health regulations, longer life and happier days. The farmer will know more and love his calling better. He will visit the saloon less and spend more days at home at work or study. In the future he will attend more Farmers' Institutes or conventions. And so there will be more productive farms and less of debt. So there will be in the country better homes, healthier homes, cleaner and happier homes, and as the farmers' homes are free from mortgage and debt and then made independent in selling their produce, monopoly and oppression will be broken, and in the same proportion will our government be made more stable and secure.

"Lift up your heads, desponding freemen,
Fling to the wind your needless fears;
He, who unfurled our glorious banner,
Says it shall wave a thousand years."

EDUCATION AND THE HOME.

BY WM. NOONAN, HARTFORD CITY.

[Read before the Blackford County Farmers' Institute.]

A good home is the unit of a good government.

Living as we do in the last age of the world's history and in a land of unrivaled natural advantages, good homes should be the rule instead of the exception. Ours should be pre-eminently a land of homes. Theorize and philosophize as we may, the vital question of the century, and of the present hour, is not the tariff, free coinage of silver or who shall secure the postoffices or public printing, but, wether society shall breed criminals or civilized humanity. Heredity and environment are essential factors in the solution of this important problem, but education must ever be regarded as the corner-stone of civilization. The education that does not contribute to the elevation and betterment of humanity, morally and physically, is defective in the best features. Man in his best estate is considered the greatest and noblest work of God that has yet been discovered on this grand old planet. To such a one the world is full of sunshine and flowers, lovely scenes and happy creatures.

Someone has wisely said, "Think for thyself one good idea, but known to be thine own, 'tis better than a thousand gleaned from fields by others sown." The great aim of life, however, is not to think, but to act. Not to be cultured and refined, but to be good and true. If a cultivated mind, broad views, tender sympathies and a lofty purpose are not useful, yea essential in the everyday affairs of life, we know of nothing that is. How to live pleasantly, honorably and happily the few fleeting years allotted to us and make our impress on the line of advancement, is a matter worthy of the serious consideration of every rational creature.

It would be a waste of time to dwell for even a moment on the very threshold of the twentieth century in giving a reason why we should educate, educate, educate. Our republican institutions, though affording a fine field for the development of all the qualities of heart and brain, which in a great measure establishes man's claim to the noblest work of the Creator is not in our opinion very thoroughly worked. We are neither surprised at this nor in a despairing mood. Statesmanship has been on a very low plane for more than a quarter of a century, and as a stream can not rise above its source, it requires no gift of phophecy or stretch of the imagination to determine the logical, the inevitable effect it would have on society and on our common country. Revenue, revenue on every hand from the necessaries of life as well as from the vices of the people. And how passing strange too, that the preachers and teachers and their churches align themselves with the upholders of political and social systems that impoverish and imbrute mankind instead of for what is orderly, brotherly, for justice to the needy and oppressed, and for brighter and happeir homes. Peace, harmony and mutual assistance is the latest divine message received. Though not written in ink, was sung by angelic choristers from the midnight skies, it is clearly indicated by every pulsing throb of humanity. For nineteen centuries men have been talking and praying for peace, and loudly enunciating the gospel of the Prince of Peace, and at the same time spending with a lavish hand millions of the people's money in fortifying our coast lines and constructing iron-clad ships of war, apparently trusting in God, but cautiously keeping their powder dry. Thus evincing a want of confidence that is now alarming the lower strata, who for lo those many years, with an "innocence childlike and bland," opened their mouths and closed their eyes (somewhat after the fashion of young robins anticipating the arrival of worms), and gulped down with avidity the religious and political morsels so daintily prepared for them.

But this is an age of progress, and reasonable allowance should be made of course, for the apparent vagaries and inconsistencies of those who are manifestly deeply interested in our temporal and spiritual welfare. Ignorance and selfishness constitute the great bone of freedom and human happiness. Neither of which ever enriched the annals of a nation with patriots and heroes. A majority of the vast multitude of men and women who come upon the world's stage are consigned to a well merited oblivion. The reason is obvious. Their lives have been commonplace, having done nothing and been identified with no good movement that deserves remembrance.

Governor Mount in a recent letter says: The future success of agriculture in this country will depend more upon intelligent thought than physical effort. Since progress and reform have become the watchwords of Christians and agnostics, and above the din and tumult of these stirring times we hear the meanest demagogues on our streets proclaiming the fatherhood of God and brotherhood of man, should we not pause for a moment or two, until some glowing patriot (if not too full for utterance) informs us where we are at? The best legacy that a man can leave to his children is an education that will enable them to detect the shams of society, to be tolerant of the opinions of others, and not to blindly worship at the shrine of mere success, which is so often linked with injustice and error.

The best products of the American farmer are the boys and girls reared in pleasant homes, where culture, refinement and truth abound, and over which love spreads its sheltering wing. If the pillars of our free institutions, that so often withstood the rude shock of war, are to endure for another century, it will not be because we raise larger squashes, or produce finer types of bovine or equine beauty so much as by an increase of the number of independent homes of that class whose shot at Lexington is said to have echoed around the earth. An essential condition for the improvement of the race, physically, mentally and morally is good homes in which industry reaps the fruit of its own toil. The management of the home affords an indication of the character of its occupants, and the mental and moral characteristics of the inmates are influenced by the character of the home.

The most discouraging feature of the future, for the contemplation of the philosopher and philanthropist is the concentration of the country's wealth in comparatively few hands. In 1650 in this great country of illimitable resources, capitalists owned 37½ per cent. of the wealth. Twenty years later 63 per cent., and to-day perhaps 75 or 90 per cent. Is this any cause for alarm? Are the facts of history of any real value? Egypt went down with 3 per cent. of her people owning 97 per cent. of the wealth of that country. Babylon with 2 per cent. Persia, when 1 per cent. of her people owned all the soil. And when Rome, historic old Rome, went down, less than two thousand people owned the entire earth. Like causes will produce like results the wide world over. Moralize and speculate as we may, nothing but an increase in intelligence and morality in this age of reason will save us from a similar fate. Our worship of God should be very largely in the commonest duties of life, instead of a Sunday affair in gilded.temples when we have donned our best apparel. If we honor liberty too, let it not be in the abstract by the sounding of praises and erecting of statues, for liberty means justice, which is the natural law. Those who think her work accomplished by the abolition of hereditary privileges and giving to men the use of the ballot, doubtless consider her poets rhapsodists and her martyrs fools. In glancing down the future. rather than the past, is no evidence of our unappreciation of the wisdom and heroism of other days which makes life worth living in the present.

We love to roam among the receding shadows of antiquity and pour out our little offering of admiration and esteem upon the ashes of her noble dead. We likewise enjoy reveling in those heroic times, and bathe our spirits in the glamour of glories long gone, only that we may derive therefrom a deeper inspiration with which to grapple the mightier problems of to-day. While the world lasts, the same fierce old battle must be fought in every generation. Intemperance, corruption, oppression and greed, like huge giants, rear their hideous forms on every side.

In view of these indisputable facts, can you and I fulfill our mission on the earth, if we are simply like dumb, driven cattle instead of heroes in the strife? We can not well evade the answer. Though, perhaps, as yet unuttered or unwritten, it will find indelible expression engraved with the stylus of history in the granite of events. In many of our high schools and colleges to-day, we notice that enthusiasm for aught but athletics (foot ball, etc.) is in bad form, and lofty ideals such as we have alluded to are not half so popular as pool and poker. We mention these things, not because they are pertinent to the occasion, but because they are facts, and you want them, but are too busy to search for them through the labyrinths and mazes of art and letters as we have done.

And now when you remember that man is not primarily and fundamentally an apparatus for the mastication and digestion of other forms of life (though many do but little more) you will feel encouraged, and with buoyant spirits and lighter hearts pursue the remainder of your journey.

Our lives are albums written through,
With good and bad, with false and true,
And when the recording angel writes the record of our years,
We trust he'll read the good with smiles and blot the bad with tears.

THE HOME.

BY MISS EMMA ALLEN, BOSWELL.

[Read before the Benton County Farmers' Institute.]

Being called upon by two cheery early-bird farmers and asked to contribute a bit to the Farmers' Institute, the idea struck my brain so forcibly that, in a sort of daze, there immediately slid across my mental vision a rack stacked high with hay; a procession of orderly shoats; rolls of golden butter and baskets full of eggs—I answered, "I don't know anything about farming." Then the Aaron of the two spoke, "Write on 'The Home'—that's the center of the farm." And, as it is often easier to say "yes" than "no," I said, "I'll try."

As my visitor disappeared, my mind's picture changed, and there appeared a thousand old newspapers and magazines—with "columns" on "porches" and "corners" on the "home," and jumbled among them, Marian Harland's cook books and coffee pots.

Considering the homes around which—the winding stairways up which—the play-grounds over which the feet of poetry have run, and the yards of verse already measured off, the mind goes a wandering. wondering if there is a single point untouched by the pencil of man—left bare by the woman's pen. But the idea sticks and the old song drifts by, "Be it ever so humble, there's no place like home," and we know that the thought has grown fast in the heart of man—tender in the life of woman.

Webster defines home—a dwelling place, residence, tenement. But the definition is unsatisfactory. The word hints of life, and we can not help recalling the primeval home of man, when time was young and the lone pristine gardener slept, heavy-hearted—in the sun—unconscious of the first great surgical operation, since which there's ever been a woman in the case. So the home alluded to in the farmer's mind held a woman—and now our story runs, not residence or tenement, but man and woman.

With latitude and longitude, with forms of government, climatic influences, station and education, the home changes yet remains the same. Be it the red brave's tepee—his pipe his company—his wife his slave. The Esquimau's snow hut is incomplete without his oil and dog, fishbone and wife.

Wearing neither crown nor robe, we approach not the throne of kings or queens. Counting no beads, we trespass not the doorstone of mitered pope or gowned monk.

Let the wind not stir the twigs of the tent—the sun not melt the snow of the hut. Draw not the bolt of the palace door nor raise the latch of the priest's abode—we question not the life of squaw or nun—of king or priest.

The scroll winds and the glad rolling prairies, the squarely fenced farms come in view. Will you now learn the rules for raising great pumpkins, strong onions, wise cabbage heads and sweet peas? Again the writer goes a wandering with the vaguest notion derived from a terrified glance at the almanac's frontispiece where, from a single man's anatomy radiates a pair of balances, a pair of twins, a crawfish and a lion. I think these all get away to the zodiac, but there we fly off on a tangent—the signs have failed. Back—back "where the hollyhocks are blooming round the door."

Does the home consist of costly carpets, beautiful lawns, fine carriages, blooded horses? The home, complete, depends upon the homekeepers. The home life is the visible result of the life in the home. It is all in the life. A good man and a good woman make a paradise; a bad man and a good woman make a stopping place; a good man and a bad woman make a purgatory; a bad man and a bad woman make a hell!

An apple—belleflower or maidenblush—depends upon the heart of the bloom. The Home—stone front or pine shanty—depends largely upon the woman, and woman's life upon her thoughts. If she could keep her mind orderly and clean her home is apt to be. If her mind goes to beautiful things and she thinks in rythm, her home will be a picture and music will be heard.

But the question comes, can a woman keep her thoughts—every thought—right and true in time and place. She has told me her story. The word "wife" no more expresses what a woman's life is than does "residence" express what the home is. It has been the custom so long for a man to look upon a woman as a piece of property that many men are perfectly blind and deaf to the real life led by their wives.

Some women who find it necessary to support themselves, keep boarders—and a very strong woman finds her hands full in taking care of six boarders, and if the number reaches ten or twelve the washings go out and a hired girl comes in—they buy meat, fruit and vegetables, all sent to the door, and consider they work hard for a living.

How about the farmer's wife? Some women do the work for ten in the family, including hired men, thus earning the wages of cook, which ought to be at least $3.00 a week; they also wash and iron, which is worth at a small estimate $1.00. Many care for a sick child or an aged invalid; then there's the common sewing, mending, darning, etc. The garden is often made by the women; the yard is cleaned, the house kept, and how do they ever survive the terrible brain roasting during the harvest and threshing time; and the butchering days, with backbones and sausages long enough to girt the equator?

It has long been a wonder to me how these heroines ever get to the county fair; how a woman can wash and rig seven children for five days in succession, and take dinner along for the family, hired man and the friends who drop in when the race is done. Then, when the man leans on the fence and cheers his favorite trotter, the woman keeps her eye on the "7." She determines how many balloons are due to Johnny, how many times Mary rides on the merry-go-round, buys the candy and corn for the smaller ones, carries one on her hip and leads two.

Besides the work named, many keep a small poultry farm. The money realized from the droves of fluffy chickens, the turkeys, eggs and butter, goes to pay the grocery bills. But really is there anything wrong with this? Looking in one way it seems right, always right, to be industrious and economical. And the man works awful hard, too. But, my! see his physique! He is a tower of strength, and the giant hands go with him to battle with the clods. The wrong I see, is that in so many cases, aside from the stagnation of mind and dwarfing of soul, the man grows rich; yes, rich in land and cattle and corn and horses; and the woman stays poor, yes, poor; often pooorer than the wife of the day laborer. Knowing so little of her own real worth she seems to acquiesce in thinking the man is worth his thousands—she her tens. The man may spend his hundreds just as he pleases, and gets a big name. The woman counts her dollars so carefully, the bills cling to her fingers; she seems to feel she is not spending her money and she must give an account. And there's the children; they belong to the woman. She feeds them and clothes them, cares for them during sickness and gets the idea that the expense of bringing them up is all her fault; she must account for Nellie's beau, for all the rips in Henry's pants, for the stubbed toe and spilled milk.

If any woman ought to observe cause and effect, the farmer's wife has rare and frequent opportunities; she might compare the wee one toddling by her side with the big-eyed pansy by the shady north window or the bright petunia blooming in radiance on the sunny south slope. While she proudly pats and admires the new colt or feeds with warm milk the shaky-legged lamb, she might glance at the cradle and draw her own conclusions; sink into her own reveries of whys and wherefores.

A word, a question, to the farmers: What effect does it have on the home when the farmer's team is tied to the town hitchrack long after the dry goods and grocery stores are closed? How does the woman feel who is waiting at home for the sound of wheels? How do the children feel who go to bed with father out yet? And how does the man feel who goes home, the stars condemning, the shadows moving in unrest and stealthy pursuit. And, candidly, has the farmer any honest business where the curtains are drawn to hide the stock for sale?

The man has so many outings—the woman all the innings. Following the plow becomes a pastime. He notes the ways of the clouds! he watches the bursting of the seed and spread of the blade; his long ride to town on a load of corn gives him happy time for reflection. The breeze takes away all his care, soothes his nerves, and his life is a jolly one, reaping the great fields of beautiful wheat and the corn from wide stretching acres; finding his way through the woods where the bright leaves glow on the sassafras tree and the shellbark nuts are merry in falling.

But this is a talk on husks. Dryden said: "Home is the sacred refuge of our life."

There is but one thing that brings order out of confusion, sweet out of bitter. One thing that sanctifies labor—that repays trial—one thing that makes the rough waters smooth—and this is the greatest thing in the universe. The rich may possess it; the poor may have abundance. It may light the hallway of the mansion—it may shine from the pane of the cottage. This is—love! Love dignifies the lines in the woman's tired face. Love makes the burly hand of the farmer soft as the velvet touch of the child!

When an intelligent, honorable farmer loves his wife he emancipates her. Many of these slave wives are loved, but the husband has not grown to the full stature of manhood—giving honor for honor, purity for purity. There are ideal homes on the farm; much of our best brain comes from the farm; many of our best ministers, lawyers, statesmen first learned to walk on the farm; but there's a louder call to-day for good citizens than good lawyers!

It's all the life, wherever we live—city or country. 'Tis the principles taught; the honor in small things; the heart of the man and the woman.

What God hath joined together let not man or woman put asunder.

HOW TO MAKE HOME ATTRACTIVE.

BY MRS. CHAS. KERR, NEWTOWN.

[Read before the Fountain County Farmers' Institute.]

If the home is graced and sweetened with kindness and smiles, no matter how humble the abode, the heart will turn lovingly toward it from all the tumult of the world, and it will be the dearest spot beneath the circuit of the sun. The influences of home perpetuate themselves; the gentle grace of the mother lives in the daughter long after her head is pillowed in the dust of death; and the fatherly kindness feels its echo in the nobility and courtesy of sons who come to fill his place. While on the other hand, from an unhappy, misgoverned and disordered home go forth persons who shall make other homes miserable, and perpetuate the sourness and sadness, the contentions and strifes which have made their early lives so wretched and distorted.

It is toward the cheerful home the children gather; it has attractions for them even after they have sought other homes. An attractive home must first have a government, but love must be the dictator. "I am one of those whose lot in life it has been to go out into an unfriendly world at an early age," says an unknown writer, "and of nearly twenty families in which I made my home in the course of about nine years, there were only three that could be called happy homes. The trouble was not so much the lack of love as the lack of care to manifest it." Of what use is love that does not manifest itself? Even the love of God had to be manifested in the incarnate Word before it could save mankind.

Then if we could only overcome self. A great many of the unpleasant things that come to us in life come through selfishness. If fathers could realize how utterly selfish it is in them to take up the whole of every evening reading their daily papers, and the mothers by their everlasting stitch, stitch. What if it is a stocking to mend, can't you find time to mend it some time when the family are not all there?

To the busy farmer the evenings are the one time in the day that the family can be together, and all must unite to make home happy, each contribute something for the evening's amusement; bring something interesting and amusing. This is what makes home life cheerful and joyous; then there will be no wish to spend the evenings from home, nor time will not lag. Talk over the events of the day; sympathize and listen to the children's stories. To fully understand the little ones you must sympathize with them. When a child asks questions don't meet it with "Oh, don't bother me." Tell it all it wants to know. In this way you gain their confidence; make companions of each other. Remember that conversation in many cases is just what prevents many people from relapsing into utter selfishness at their own firesides. Then if we could keep from getting angry—but if you do, no matter how much you may be tried, don't let the angry words come—it never pays to be hasty, to be angry, to be selfish. If you have not already a happy disposition, cultivate one; being good at heart is not enough, for good professing and bad acting make many a skeptic. Fill your heart with the love of Christ, then let it come to the surface, and like sunshine fill the home. The secret of comfort lies in not permitting trifles to vex us, and in cultivating little pleasures. When you have a friend, a visitor, give them a cordial welcome and draw them out to show their better selves. The power of bringing out the best in people is not entirely a gift, it is something that can be cultivated, and is, in truth, a fine combination of sympathy, tact and self-forgetfulness. Then don't get pretty and attractive furniture and bric-a-brac, put it in a room, close the blinds and let them stand in there for musn't-touch-its, but use them. It don't take long to get the children to know that the plush-bottom chairs are not to stand on, but are to be used and kept nice. It teaches them to take care of nice things, and then, when you take them with you to some one's else home, you do not have to sit in mortal agony for fear they will spoil somebody's else nice things. My motto is, "Have no room too good for your family;" no furniture too nice for them to use, but make it as attractive as your means will allow. Then our table should be spread with everything good and enjoyable.

We should have pets, flowers—everything suggestive of sociability. Flowers are indispensable to the home, but do not give them all the sunniest windows and pleasantest corners, crowding out the children, but give the child the care of some of the plants; it will teach them lessons of love and industry. Then there are so many games that are harmless, some of them amusing, some of them instructive. These games are helping to make the home of the country happier, helping to make the children more contented with their homes; and in doing this they are helping to make the country more intelligent and more virtuous. Then there is music; cultivate singing in your family. At the present prices most every one can have an instrument. But what good is an instrument without a player? What good a voice if you do not use it? But how often we hear, "So much to do, I don't have time for music any more," and let the ordinary cares of life crowd out one of the greatest attractions. Mothers, remember the songs that were sung to you and sing them to your children; the memories of those songs go with them through life. Ah, home is to be the happiest and most delightful spot on earth for all the family, as they love one another. The honest man will then go gladly to his work, and, when the day's labor is done, will come joyously home to spend the evening, where wife and children, the tidy table and cheery fireside await him. And the wife to her daily duties; for she knows that, in the words of Solomon, "The heart of her husband doth safely trust in her; she will do him good, not evil, all the days of her life; strength and honor are her clothing, and she shall rejoice in time to come. Her children rise up and call her blessed; her husband also, and he praiseth her."

HOW TO MAKE HOME ATTRACTIVE.

BY MRS. S. V. WELLS, COVINGTON.

[Read before the Fountain County Farmers' Institute.]

We judge of our people by their homes, for the home is, in great measure, the index of the character of the home dwellers. This applies to the outside of the house as well as the inside. The man or woman who seeks to make the exterior of the home attractive, as well as the interior, is as much a public benefactor as he who builds costly temples, even though he be only gratifying his own taste.

A well-kept house and yard is an educator, however humble it may be, and the man or woman who spends money in decorating his home, because it is his home, is not so selfish as he might appear. The humblest home may be made a place of beauty at so little cost in money and time that it seems that flowers should be found about every country place, great or small—we have so much more free air and sunshine than our city friends that we can well afford to have more flowers.

The farmer who owns his farm and is out of debt has little excuse if he neglects or refuses to adorn his home. It should be surrounded by flowers, roses and some shade trees; a beautiful lawn, small fruits, and so symmetrically arranged as to pleasingly affect the beholder. Whatever our little pleasure ground is, the most important is to arrange it judiciously and secure by wise planting a constant display of verdure and bloom from June until frost.

Have plenty of flowers; adorn your rooms with them, put them on your tables, send bouquets to your friends who have no flowers, or exchange favors with those who have. The cultivation of flowers tends to bring out that which is best and finest in our natures; so make the dooryard bloom with beauty in the summer and have a thought for the plants for house decoration in the winter. Flowers of all kinds give an air of taste and refinement which speaks volumes for the good sense and good heart of the owner and his family.

Have plenty to read; reading matter is cheap. Buy a good book occasionally; and, before one hardly thinks it, a good-sized bookcase is filled. Plenty of newspapers, a magazine or two, and store our minds with useful knowledge, for we know that intelligence makes better work besides being a great source of happiness to the possessor. If you have but little to read use well the little you have. A good collection of books and general literature is more desirable than costly furniture, and the man who is able to do so but neglects or refuses to furnish his family with such needed food falls far short of his duty. We should not only have these but we should read them that we may be regarded as intelligent in any circle of society that we may chance to be. But a library full in every department of learning never made a man a scholar except as he studied the books. To one who will not read it has no more value than blank pages.

A well-regulated household is a blessing. We can all add to the attractiveness of home by having a place for everything and trying to keep everything in its place. Our husbands and boys can do much towards keeping our floors clean if they will change their work shoes for clean shoes or slippers when coming into the house; it takes but a short time to change, and the change of footwear rests one wonderfully, and to have our homes attractive we must have them clean, but do not have your house too nice for every-day use. I am not one who believes in building a good house and then living in an old house off to one side, so as to keep the new one new and clean. I know people who live this way, but I have no use for anything that is too nice for my own family. What is good enough for my family is good enough for my friends. Have sunny rooms; they do much toward making sunny lives. Do not shut up your house lest the sun fade your carpet, and your hearts, lest a merry laugh should shake down some of the musty, old cobwebs there.

We must not regard home as only a place to eat, drink and sleep. Young people must have fun and relaxation somewhere, and if they do not have it at their own hearthstones it will be sought at another, and perhaps at less profitable places. Half an hour of merriment around the lamp and firelight of a home blots out many a care and annoyance during the day. Put home first and foremost, for the time will come when the home circle will be broken and when our only pleasure will be in remembering we did all in our power to put a song under every burden to make each other happy; make home the most congenial place on earth. Bring out the innocent games, sing, and tell your latest joke. To be cheerful and contented makes home beautiful; "Laugh and the world laughs with you." It is an excellent art to be a good entertainer and make a guest feel comfortable and at home in your house. Some of our pleasantest memories are of such good people who, perhaps in very lowly homes, dispensed a true hospitality that quite cast in the shade many more costly entertainments. And we should be courteous at home as well as abroad. One is forcibly reminded in going from place to place how small and trifling, often, are the things which go to make or mar the comfort and peace at home; in some households there is a genuine good-will and kindness which only works half its mission for the reason that it does not express itself in little courtesies of speech and action. These are more important than some of us busy ones may realize. The ready "Thank you," "If you please," at table or elsewhere; the quiet "Excuse me" when obliged to pass directly before or inconveniently near another, the loving "Good night" and cheery "Good morning," although little things, are helps in making a happy home. Courtesy is but the ready overflow of kindness and good-will to all, and is, therefore, a natural expression which costs nothing but which often cheers an aching heart, and which never fails to make home brighter and more attractive to old and young. Home to be not "merely four square walls" must be beautified by a woman's work. Every article which adds to the pleasure or comfort of its inmates is a blessing. Surroundings are but a part of our education, and then each to each owes a duty of doing and being the best we can. Feminine home-makers and keepers have much to do, but the secret of life is not to do what one likes, but to like what one has to do; use your brush and needle in ways where it will please others. A few pieces well and creditably finished are worth dozens carelessly made. Don't overdo this and fill your rooms with trash whose use is questionable and beauty doubtful. Practice moderation in this as in all things, save in doing good and reading good books. As to dress, we believe it our duty to appear at our best; we can do no less than add our mite to God's beautiful world.

And I think every home should have some kind of music. If you can not afford a fine instrument, get a cheap one; but try to have some kind, and get it while the children are yet small, for they haven't so much to take up their minds, so apply themselves better and learn more readily than after they get older; and music has charms for every one. We all like to hear it. It is a means of education and culture, and as such is deserving of our esteem and most diligent cultivation. To make home attractive means work, for improvement comes through effort and not through wishing, and we are dull sluggards without ambition. All this ought to help to make any home attractive, let it be in the country or where it may.

WHAT PURDUE CAN DO FOR THE FARMER BOY.

BY ROSCOE J. COUGHLIN, LIBERTY.

[Read before the Union County Farmers' Institute.]

Having taken the short course at Purdue, I feel that I might say something to encourage other farmer boys to do the same. In the short course, especially to those who secure the free scholarship, the expense is small, and I think it pays well, even if one could go no longer than the short course, and it better prepares us for the long course should we take that. By going there we meet many farmer boys and men who are eager to learn all they can about farming in so short a time, the right way of farming, the most profitable way, how to make a success and avoid failures. We are taught what kinds of fertilizer to use on the different kinds of land; the disease of live stock; how we may be able to treat them ourselves; also, live stock husbandry; the best kind of horses, cattle, sheep and hogs to raise, and to know a good animal when we see it. Then, there is the dairy, with all the latest improvements and methods of butter-making. I did not take dairying, therefore know little to tell you of that branch. We are taught farm drainage, which is a very important study, yet I think farm sanitation far more important. It teaches us how to locate our farm buildings so as to best secure all waste matter that gathers about barns and stables, and to keep everything clean that we may avoid all disease germs. All these and many more subjects I have not mentioned we have the opportunity of learning either in the short or long course at Purdue; otherwise, if we should stay at home expecting to learn all this by experience we would be old, gray-headed men, ready to quit business, probably, before this knowledge, or even one-half, would be obtained. We find a great many farmer boys discouraged and ready to quit farming, if they only knew what to do to make a more successful business. Let me say to those boys, Go to Purdue, see and meet the half-hundred boys who come from off the farms to learn more of farming; see if they are not as bright and intelligent as any class of boys you meet. Light-hearted and happy fellows, ready to assist each other in any undertaking. There you will see ours is not a life of hard work, ignorance or disgrace, even if our complexions are sunburnt and our hands slightly rough; you will also meet many of the professors who are teaching us, and they, too, of the very highest ability, regarding us as the coming farmer of our beautiful land, and helping us in every way to improve ourselves in that line. Let us not be discouraged, boys, when we know the farmer is king over all other business men, and the most free and independent. No matter what happens, the farmer can live if any one can.

When we see the city boys with their white hands and unsoiled linen calling us hayseeds and country Jakes it makes us cast our eyes down at our coarse boots and pantaloons and rough coat; yet, nevertheless, we must not let this discourage us; we are the most independent, no matter what they say. The State of Indiana is proud of her farmer boys. If she is not why would she keep up such an institution as grand old Purdue, with all its offering of knowledge, ready to instruct us with the best ability Indiana can procure?

OUR BOYS AND GIRLS.

BY MRS. ELIZABETH PERCUPILE, RENSSELAER.

[Read before the Jasper County Farmers' Institute.]

It is said we are living in an æsthetic age, and the boys and girls are drinking from the sorceress's golden cup. This age has transformed Satan into Gabriel, and temptation is transformed into angels of light and beauty. Ours is a world in which man's secret strength has its full revelation only through fierce conflict, sometimes with adversity and opposing circumstances. What is best for the youth of to-day, no one has been able to solve to perfection, only to give them opportunities and educate them in the broadest sense not to be narrow-minded, but to battle with all the conflicting elements which surround them. Severe tests alone reveal the weak spots of our children, or until temptation builds its ambush and hurls its weapons. Then the full revelation of his or her strength or weakness is manifested. Often the children of obscurity and poverty make the best men or women of genius who grasp the skirts of happy chance. "Evils do not come without causes, and causes are not supernatural."

Some say that circumstances make the boys and girls what they are; it only shapes them. No combination of circumstances will make heroes of born cowards; nor honesty from born thieves. Human beings are made up of a thousand or more of delicate instruments packed away in the human body, for protection and aid, which makes the physical system to be a veritable castle with walls, breastwork, and watchman standing upon the tower. "God's plan for protection and defense was given to human beings for development and safety." The body, which is made tier upon tier of faculties, the nature of every one points towards happiness. If we attain this happiness it is necessary that we have a good, healthy body and a well-regulated mind. This progressive age, with all its advantages of learning and skill, has many allurements, too numerous to mention, to draw the mind backward instead of forward.

The important thing for boys and girls is to have an aim in life, something that they will enjoy and pursue it with perseverance; not getting and possessing, but becoming and being, that will make them men and women. We can not overestimate the value of a good education. A common school education with good common sense is better than a college education without it. A boy or girl without imagination, or wit, is like a wagon without springs—every rut gives a disagreeable jostle. Experience teaches us that the moral giant has his unyielding manhood through the fact that a thousand temptations conquered hath lent him strength to overcome. I can not go into all the details; I will leave it for discussion. The temptation that comes in for destroying, when resisted, remains as the substance of character for defending the soul in its conflict. Many remedies have been discovered, but no one hath yet been able to build a wall thick enough to hold the evil influences at bay, or a tower so high that no shaft can rise above his strong defenses. The question is, how to meet the evils of to-day. Sin is a destroying angel. It is here and has come to stay. You meet it in every phase of life; nothing excluded. Life is a struggle from cradle to the grave, but vigilance is the watchword. He who would make his children temperate by good instruction and good example would not shut them up, for they gain stamina from the temptation they resist. Occupation of some kind is very necessary for the mind. Teach the children to think. The transfusion of thought is more quickening than transfusion of blood. A good, honest trade well mastered is worth a dozen professions. Every one should reap from his occupation as much pleasure as he can in congenial occupation; then you will have little need of amusements. Amusements are natural and necessary—they are moral. Boys and girls should be happy.

It is a shame for a community as large as this not to have a free reading room; next a gymnasium, the health-giving amusement. Don't be afraid of a little fun at home. The best safeguard they can take in life with them is the influence of a bright, cheerful and domestic home, that binds together the whole household. If you want to ruin your sons and daughters let them think that all mirth and social enjoyment must be gotten elsewhere.

AGRICULTURAL EDUCATION.

BY M. SCHUM, MARIAH HILL.

[Read before the Spencer County Farmers' Institute.]

There never was a time when society and the State paid more attention to this important subject; as never before it meant as much to be a true and patriotic citizen of our State as it does to-day. Not only in the United States, but throughout the world, men are rising to a more complete sense of their manhood. The question is, How must we be fitted to be a true citizen of our State? Education is the essential thing, and without a good education there can be no full and intelligent discharge of the duties of citizenship. Many States of the Union have recognized the necessity of making education compulsory, and we can be happy to see that our State has followed the principle. Whatever vocation of life our child may enter, we dare, under no circumstances, neglect the common school education. Whether our children may be boys or girls, give them all the educational advantages possible that they may go forth into the world well prepared and strengthened to fight the battles that meet them in the course of their life. The young present generation that goes out into the world without a liberal education will soon find they are handicapped by their companions, who are prepared by years of study and now filling all the prominent positions where skill and a thorough education is required, because the preparation of their early years was sorely neglected. When those skillful companions were laying a good foundation in school for a bright future, those who are now so unsuccessful were idling around on the streets merely having good times, with no thought for the future. Besides the common school education our children should be taught what labor is, and what it signifies in its relations to all the movements that constitute the wealth and prosperity of the State. Let them know that labor is the foundation and the beginning of all wealth, both for the individual and the State, and that it is impossible to have prosperity, or even the comforts of life, without labor. I think the greatest curse that can come to the children in a home is where they have nothing to do after they come home from school, and therefore find the time hanging heavily, unless they run out on the street to seek amusement there. Here the farmer has certainly an advantage over the town and city folks.

It is deplorable that our youth should grow up with little or no respect for manual labor, when labor makes them independent and self-respecting citizens. Labor should make the life sweet, but it is a sad thing to see that for so many farmers labor is the heaviest burden that ever was loaded on to them, and therefore it makes their life bitter, and we can always find them to be discontented. The question is, how shall we farmers, as parents and educators, educate our young generation and bring them up to be patriotic and self-respecting citizens if we ourselves are ignorant and don't want to recognize our ignorance? "The man who knows not that he knows not is a foolish man, but the man who knows that he knows not, he is a wise man," said Shakespeare, and it is surely true, because as soon as a man knows that he don't know he is always willing to learn, and always finds something to learn; wherever he goes and stays you will always find him enthusiastic and kind to his fellow citizens. As soon as a man recognizes his own ignorance, he has made the heaviest and greatest step towards success. I think the grandest thing our State has ever done towards the education of the farmer is that it gives us the Institute work, sends well-educated, well-experienced men around from one county to another to explain to the farmers who have come together to attend these Institutes the improved and scientific methods of farming. But what must we say for such farmers who claim to be well-educated, experienced farmers, and do not even know that we have a Farmers' Institute in our county, an experiment farm and an agricultural college in our State where young men are educated and well prepared for their callings? Too many farmers don't know that we can get bulletins from our experiment station and from the Agricultural Department in Washington only for the asking, which would be a great help to them if they would read and study them. There was once a time when the book-farmer was called a fool, and I am sorry to say that to-day we have got too many farmers who always try to discourage the young, energetic farmer in reading agricultural literature related to his calling instead of encouraging him. It is true that we can point to successful farmers who never made use of agricultural papers, Farmers' Institutes and Institute bulletins, but this gives us no reason that young men who desire to be first-class farmers should not have a thorough preparation before entering their chosen calling. The farmer of to-day who has some knowledge of agricultural chemistry is certainly better able to insure good crops than he who knows nothing of that great science. If a man knows how plants grow, feed and elaborate their fruits and seeds, he is certainly better able to cultivate plants in the right way than he who knows nothing about these great studies of nature.

In earlier years, when one wanted to become a lawyer, he had to spend years in a law office with some good attorney; to become a doctor he had to associate a long time with some practicing physician, but to-day there are law schools, the medical colleges and other institutions for training young men in particular lines. The same change is made in regard to the education of the farmer. Each State has now its agricultural college where young men prepare themselves for farming with the same enthusiasm and earnestness that governs the would-be lawyer and doctor. And why should this not be so? Does not farming make as heavy demands upon those who are to truly and loyally follow it as any other vocation or profession? If so, why should there not be the same careful preparation for the farmer, who is not only a grower of plants and animals, but a citizen who has largely to do with the affairs of the State and Nation, and upon whose intelligence and prosperity rests the hope of the Nation? Prosperity to the farmer means prosperity to the whole community, and still there are so many farmers who, in their ignorance, fight against their own prosperity. I pity those young men that are bound by precedents and have to follow the old, slip-shod method of farming which their fathers have practiced for thirty and forty years. It is not that they do not have to see that by following the improved methods of farming of to-day they would be more successful, but they imagine they have too much experience and too high a character to allow themselves to believe that there are wiser men and men with more experience than they have. Such farmers are too much in favor of saying, "I," what I have done, and in their ignorance never allow themselves to say that they have learned a trifle from their neighbor and fellow-citizen.

Here I remember a short story from a father and his little son. The father always went to the mill on horseback with a half-bushel of corn in a sack. He always put the corn in one end of the sack and the same weight of stone in the other end to keep the sack in balance on the horse. One morning the father was preparing again to go to the mill and his little boy stood by his side and watched what his pa was doing and, seeing the ignorance of his pa, he said: "Pa, I believe I know a better way to do this. I would put half of the corn in each end of the sack and you would not need the stones, as they hurt the horse's back." "You little rascal, you," his pa replied; "you want to be smarter than your pa is? I always done it that way and never had no trouble."

But how is it possible for us young farmers where we take the run-down farms from the hands of predecessors to farm like they have farmed, when they have robbed the virgin soil of its natural fertility through constant, ignorant cropping? Why should we not attend the Farmers' Institute if we know that there are more experienced men than our fathers who explain to us freely how to renovate these run-down farms? I, for my part, am very thankful for what I have learned concerning Farmers' Institutes, and think we all must admit that the good which comes from mingling together in our Farmers' Institutes is not only the agricultural education we get, but the broader views, the deeper sympathies that arise from coming in touch with one another. We recognize that we are kin, that we belong to the common brotherhood of man; we learn to know each other, to trust one another, and feel that together we stand, divided we fall. If any man asks you if it pays a farmer to be intelligent, point to the Institutes. Use all your power to uplift agriculture. It would be a grand thing if all the people in the county, not only farmers, but business men and all, as they all have, or at least ought to have, an interest in agriculture, would turn out and listen to the proceedings of Farmers' Institutes.

A Governor-General of Canada once said that no man raised among the aristocracy of England would consider himself a gentleman until he had a thorough understanding of the principles of agriculture. It matters not where a man is in this world, in the printing office or in the lawyer's office, he should always be an earnest worker in the cause of his fellow men. That is the true secret to success everywhere, and when a man measures his work in any department of life by simply the amount of money he gets for it he will grow smaller and smaller all the time. Their hearts contain so little patriotism that they can not see the largeness and the character of the work done for the commonwealth.

The work of our Farmers' Institute is really a patriotic work, and this patriotism, every young man ought to feel, as it will once be called for at his hands. I have little regard for a man's religion that can not take in the growth of his people. I have little regard for a man's patriotism that does not take hold of forces like this and work for a work that is grand and glorious for the advancement of his people.

Civilization began with farming, and ever since farming began it has improved from year to year, and therefore never let us talk so much about old methods which were practiced thirty years ago, as the world has no use for it to-day. Do not let any one make us believe that times are too hard, that we can not succeed, as all the goldbugs and all the silverites will not give us any relief if we do not try to help ourselves. The soil and the sunlight, the rain and the snow, the manure and the seeds, and the mode of tillage are not governed by anything in Wall Street, nor by the silver producers of Nevada. If thoughts of hard times depress our hearts, think of all these things, attend the Farmers' Institute, read agricultural papers, try to learn from your fellowmen how to become an independent, self-respecting citizen. Try to really be what you are; be satisfied with your vocation and dissatisfied with your conditions, and you will always try to make improvements, and be happy. Always try to be a better farmer, but never try to be better than a farmer, as there is no happier home on earth than the home of an intelligent farmer, a true, patriotic citizen, who tries to do all be can for the commonwealth and the prosperity of the whole community. But before every patriotic work for the community we, as educators, dare not forget to be patriotic against our children, but we must know that if we make them happy now they will be happy for all their life by the memory of it.

HIGHER EDUCATION.

BY MRS. MARY PUGH, FAIRMOUNT.

[Read before the Grant County Farmers' Institute.]

There is no subject of more importance than the higher education and development of manhood and womanhood upon the farm. Nature seems to have so arranged that agricultural pursuits shall ever remain the chief employment of the great majority of mankind. Life on the farm should be the nearest to the ideal life of any other occupation. No other industry dates back to so early a period as the tilling of the soil, and there is no calling more elevating to the mind than agriculture. Its teachings are the loftiest that man can seek and it should be nearer to the ideal life than any other occupation. It is from the soil that we derive all that constitutes wealth, and of all the material gifts of the Creator, the various productions of the soil are of the first and of the utmost importance to man and woman than in any other trade or profession. On the farm we come in direct communication with the beauties of nature, and nature's God, and cultivation of the soil should thrill the soul with rapture. More thought and attention is now given to farming in every section of the country than ever before, and it is now found that no business presents so certain and remunerating results as agriculture, when those who engage in it have been so educated as to conduct it intelligently. Educated minds upon the farm have extended in all directions; they apply to retaining the fertility of the soil, in growing all kinds of grain, grasses and fruits and every branch connected with agriculture. Farmers should have as thorough an education as men in other branches of business, for the success of the farmer is the prosperity of the city. It remains true even to-day that the farm is the chief and best place for the training of capable and earnest men and women that exists in this country. It is otherwise in Europe, where one does not find a class of people corresponding to our independent American farmer. But with us the boys and girls on the farm are learning real things. The farmer's boy knows early about land and soils, about crops and their rotation, about the seasons and the weather. He grows up in familiar acquaintance with animals; he helps in the planting and in the harvesting; he is usually versed in wood-lore, and knows trees and plants; he learns about tools, and masters the complexities of farm machinery. In short, the range of the practical knowledge of a farmer's boy becomes very great, while the town boys too often are merely studying in books the pale reflection of things.

Education is the vital principle of our future development. The value of an education can not be overestimated. Education brings one in closer touch with nature and nature's laws, and a study of nature is inclined to elevate. Generally speaking, ignorance tends to unhappiness; it is among a class of people who are deprived of an education where abject misery is found, and where so many of the great vices of the day are perpetrated. Glancing back over history we find that there have been great strides forward along the line of intellectual improvement. History tells us that in an early day a great many of the people were ignorant and superstitious, but there has been a great change wrought, and this great change has been accomplished by a higher development of educated manhood and womanhood. In view of the fact that this higher development of educated manhood and womanhood has dispelled superstition and brought the country out of darkness into a broad, clear light of knowledge, making the people broader minded, enabling them to see and appreciate the beauties of nature and making the world better, we should not stand idle, but press on to higher achievements. The Nation's destiny is in the hand of those who set their standard high, who have determined to be an honor to the human race and a star in the nineteenth century by honest labor and an intelligent judgment directing the sturdy arm of labor in the fields or among the flocks. The principle of their life work is based on truth and justice. It is more than these; it is life, hope, freedom and opportunity for the highest development of the man, as well as the soil, crops and flocks. The operations of practical, successful agriculture must be a blessing to humanity and a profit to the farmer. It builds and supports his home with the comforts of life; it befriends his wife, civilizes the man, educates and endows his children and affords opportunity for their higher development and greater good and happiness.

It is admitted that environment is a conspicuous factor in the process of development. The mother in her home exercises a lasting and important influence; careful training in the home will make good boys and girls, and the right kind of boys and girls will make good citizens. If the future generation is to be of a high moral character the boys and girls of to-day must not be neglected, and as they develop into manhood and womanhood they will show the effects of early training. Then there is certainly a great responsibility resting upon the parents. Womanhood upon the farm, mentally, morally and physically trained to the very highest degree of efficiency, can be nothing else but a heaven-sent blessing in whatever capacity she may be placed. She has formed habits of self-reliance, sound judgment, perseverance and endurance, enriching her mind, elevating her life, active in good works, firm for God and the right in noble reform, she steps forth better fitted to be the guiding star of the home over which she may be called to preside, an inculcator of those principles from which emanate the sentiments of a higher life, for it is the spring-time of promise for a grand and glorious womanhood.

Woman has proved herself equal to man in everything in which she has had an equal chance. In mercantile life, in the medical profession, at the bar, in the school room, and in the pulpit, she has demonstrated to a certainty her success, and womanhood upon the farm to-day is advancing in intelligence and education. The whole aspect of life has been changed for the womanhood of to-day. Her life is now full of splendid and inspiring possibilities—the old joys of home and family still remain, but the horizon has widened and, beside these, are rewards and triumphs not possible forty or fifty years ago. As a historical curiosity, perhaps showing in what light woman's work was viewed in that day, is the early experience of Susan B. Anthony. It has been over forty years since Miss Anthony first lifted her voice in public. It was at the New York State Teachers' Convention in the city of Rochester that Miss Anthony was in attendance for the first time. There were about one thousand women teachers there and about two hundred men. The men were certainly a glorious minority. They gave the reports, made all suggestions, nominated committees of themselves, and, in short, they were the convention. Not one of the women had raised her feeble voice in approval or protest. A question came up for discussion, and Miss Anthony rose and said: "Mr. President." The president rose up in all his presidential dignity and said: "What will the lady have?"—just as if some one had fainted away, or something had happened. The thought had never entered the man's head that one of a thousand women should speak when there were two hundred men present for that purpose. Again she repeated: "Mr. President, I would like to speak on the question under discussion." The president looked down on the handful of men, who, of course, had the good seats in front, and inquired solemnly what was the pleasure of the convention. Then some gentleman arose and made a motion that the lady be allowed to speak. For half an hour they discussed that motion. Finally, by a small majority, she was allowed to speak. Women were never so highly favored as they are to-day. With increased knowledge have come financial independence, self-reliance, and, more than all, the continual opportunity and ability to be of use in the world and to help others. To-day the life of womanhood is full of interest, of keen activity and of future promise; and she is none the less refined, and gentle, and sympathetic. Life lies before us in all its grand possibilities. If one desires to make a success in life there is scarcely any obstacle that will keep him from it. He must be earnest and diligent and master each difficulty as it appears. The rulers and leaders of the coming generation will have to be taken from among the boys and girls of to-day, and they may now be seen striving through their own individual efforts to gain the high position on the ladder of fame and honor, who are learning the value of the grand and noble things of this life and are striving to reach higher attainments. All should bear in mind life's journey is a journey that cannot be retaken; the path we leave behind us will be traveled by others long after we have come to our journey's end.

Life and death are such mysteries and our stay here so brief, we should throw ourselves into our life-work. Every harvest is preceded by a sowing or a planting. The cultivated stalks yield the richest harvest. Many fields before us are barren because that intellectual toil which makes the high places low and the rough places smooth has not been applied in the right way. The past never offered the vast resources that are offered to-day. The gates that lead to higher development and aspirations were never opened so wide as they are now. Science, literature and art—all offer their compensations to those who desire them, regardless of sex, and manhood and womanhood of to-day are embracing these golden opportunities and pressing on to higher development.

God give us men and women;
A time like this demands
Strong minds, great hearts, true faith and ready hands.

THE FARMERS' EDUCATION.

BY WM. WATTINGTON, MADISON.

[Read before the Jefferson County Farmers' Institute.]

First. What education is needed at the present time?

Second. How can this needed education be best obtained?

The extent of this topic is such that it requires no little study to solve, yet it is one which requires no great amount of thought or study to touch on some point which is of interest and of some importance to every farmer.

Education—This theme is never wanting in its application; it applies alike to all according to capacity or power to receive. To the learned as well as the unlearned it is of much concern and of no less importance.

Dr. Beecher not only foresaw the importance of this needed education, but he realized its necessity when he wrote: "We must educate or we perish by our own prosperity."

No class has come nearer experiencing this truth than the farmers; for the want or the application of the right kind of an education, they have become, in a measure, simply "hewers of wood and drawers of water"—laborers, and not husbandmen.

The education most needed by the farmers of to-day had very little application to farming fifty years or more ago; as the term was accepted then, it was generally conceded that little or no education was required to farm. Even under these conditions the education demanded at that time was more fully abreast and with the spirit of the times than it is to-day; then, little was needed and little was used; now, much is needed, and comparatively little used.

Old notions must be abandoned; we must realize that our education is never complete, that it is better "we learn to live than live and learn." In the one we are prepared for to-morrow, ready and at the front to direct and protect our interests, prepared to run our business rather than have our business run us. On the other hand, "Live and learn." It is true from this schooling we receive the "Simon-pure article;" we are sure of what we learn and know of what we get, but in its nature it is second-hand—in a measure it is behind the times; in application often the same as "locking the stable door after the horse is stolen."

It is living and waiting for coming events to prove themselves, rather than taking careful notes from their shadows—which always precede them—and be prepared for their coming.

This is a dear school, yet there are some who will learn at no other; because it is on the compulsory plan, being based on that of experience of our own, or that of others. The experience of others is equally beneficial, yet we so often fail to heed; but that of our own is so peculiarly impressive that we seldom forget.

Notwithstanding the practical knowledge to be gained in this way, the farmers have failed to heed and apply as much as they knew, and only of late have they begun to make the best use of their experience.

We need only go back seemingly a short distance and call to mind but few who ever profited by their own experience. The old ruts were too deep to be filled with modern ideas or even experience; book-farming and science in farming, then, were "humbugs;" yet they would plant their crops in the moon, give their note for $20 to a lightning-rod peddler and pay it off with two hundred.

Everything in nature is constantly undergoing a change; all occupations must necessarily change. The people, or a class of people, who do not strictly conform to all these natural changes are behind the times: they cannot expect to share equally with those who strive and keep to the front. In other words, he who half does his work, and does not attend to his business, but lets some one else attend to it because he does not know how himself, is not entitled to the same returns as he who does his work properly and attends to his own business in an economical and business-like manner.

In this is what the farmer wants to be educated; he wants to know how to do his work properly in a systematic manner according to science: he wants to understand not a little bit about chemistry. Who ever heard of a person taking charge of a laboratory without being at least some part of a chemist? The farm is nothing more nor less than a laboratory—a place for chemical operations; the better we understand chemistry, the better we know how to carry on these operations. What the farmers know about farming of the present or knew in the past is so much known about chemistry, either through education or instinct. In the past, when our land was new, it contained all the properties to produce crops; it then was not so necessary to know so much about this science, but now the soil has become exhausted, more through our ignorance, not knowing how to keep it up, than in cropping it too much; consequently, a comparatively small amount of the right kind of knowledge, at the proper time, would have saved many dollars, much time and labor, also the extra amount of knowledge which is now necessary to regain what was lost through our ignorance. Hence, more science must be applied to the planting and raising of crops; more mechanical genius must be exercised in work and management. Yet this is not all that the signs of the times indicate that the farmers must know.

Not least nor last among the needs of the farmer is his business education, the looking after his interests outside of farm work. To do this he had better do less farming and attend to his own business abroad rather than leave it in the hands of other classes.

The farmers in this line of their education have not been underrated by public opinion, which has classed them as not capable of managing their own business affairs, and, until they do make some real practical moves in the right direction, it is wise in them to be silent.

In the advancement of other callings and the many reform movements being now advocated—and some perfected to a certain extent—the farmers are realizing the need of a broader education than what directly pertains to their farms alone. The importance of their calling justifies the importance of their education; it must not only include the farm, but the State and Nation as well.

They not only need to be educated in the proper management and cultivation of the farm, but they themselves need to be cultivated and educated in a proper and more economic management of public affairs, knowing their duty as citizens to their country, and likewise knowing the duty of their country to them as citizens.

In considering the second part of this topic—how this needed education can best be obtained—there must not only be a need for it, but there must be a desire to receive sufficiently strong to act. Our needs will not be supplied, especially in the way of education, if we do not help ourselves.

There is a way to obtain this education we need if we only have the will to try, because there is no one who tries to learn but what does learn. There are none so dull and can't learn as those who have no purpose and won't try. Following in the old ruts and doing as we have been in the habit of doing has been the means of preventing the farmers from keeping up with the times.

Habits can become so fixed and so natural that our acts seem to be governed by them without a thought as to our purpose. Into this state the farmers have for years apparently drifted.

Without breaking this spell, improvement is a slow process, and the means for obtaining this needed education wanting of its most essential part. We must heed the demand of the times—think more, study more, and act more in accordance with our better judgment.

The experience and thoughts of others obtained through books and papers should be studied more carefully and more thinking applied to our own experience.

We should make better use of what education we have, put it more into practical use, like the wise economist in saving of dollars; likewise let us save our cents (sense) and make the best use of what we have in store, as it is only what we use to some purpose for some good to ourselves and others that is of a real benefit.

The education which we most need is that which is the most practical; and the best way to obtain it is in the most practical way possible.

An education acquired at a common school or at a college is principally knowledge committed to memory. Without some practical application to and in the actual pursuits of life much, if not all, is lost. Our memory fails to retain it and we drift along through life, in a measure without an education; therefore the only way to retain our school education is to make some practical use of it in our every-day pursuits; by so doing we are gaining this needed education in the most practical way possible.

A common school education rightly applied is much better than a college education poorly used; it is the application of what we know which improves our mind and betters our condition.

It is by reading agricultural papers and agricultural books that we can know of the experience of others, and when applied to our own work we have it transferred to our own experience. If thought and study have been a part of this work, we have obtained a portion of this needed education; and a continued effort in this way in all our work in shop or field there is an improvement in both mind and condition; labor is lightened by more thought in a better way to do it; the soil is improved and better crops are produced—all because of more thought and study in our work. To this end the farmer becomes a successful producer. But this is not always a profitable success. What the farmer of to-day needs most is to regard farming as a business, follow it according to business principles and in the end make it a business success. Think more and work less, using all our school education, our better judgment and reason in shaping up the most economic business relations with ourselves, and all other occupations. That all these might come to pass, we must act as well as read, think and study. To this end some practical training is absolutely necessary, for which purpose ample opportunities are offered through the Farmers' Club meetings, this Institute work and the Grange.

Beside the cultivation of the mind and the gaining of more knowledge, there is yet another essential part of our being which needs to be cultivated: that is more self-reliance, a greater confidence in self, to utilize what knowledge we have, to maintain our rightful position in public affairs and also in society, thus establishing a greater independence of spirit, regarding the opinions of others, concerning ourselves, and that of having opinions of our own and maintaining them.

In overcoming this diffidence and distrust in self, so characterstic of farmers, Grange meetings offer a most practical school. From this do not understand that the Grange is the only means through which this needed education can be obtained, but that it is the best; which, together with the farm, offers a thorough practical course in the education we most need.

But do not be mistaken in the plan; it is one where results are accomplished by action—no action taken, no results accomplished, and your reward is naught. But, on the contrary, with an effort to try and a will to go ahead, your reward is success, because "there is no failure, except in no longer trying."

FARMERS' CLUBS AND READING CIRCLES.

Mrs. Hattie W. Harris, Kentland, made the following discussion of the above subject after it was presented by another.

Mr. President, Gentlemen and Ladies—As I was appointed only to support the leader on this subject, I have made no preparation, and hence have very little to say, but as I cast my eye over this assembly it recalls to my mind, by contrast, the first Farmers' Institute held in this hall—perhaps some six years ago—the date is not in my mind. Then we had most excellent speakers—two members of the faculty of Purdue being with us, and the lectures were both interesting and instructive. But, alas! our audience was a little group right here around the stove in the middle of this hall. In the time that has intervened the farmer has been awakened, and behold this spacious hall!—every seat being occupied by earnest men and women, whose faces evince the fact that you came here to be helped and to help each other in the bearing of your every-day burdens.

I am glad the farmer has come to see this is an age of organization. All classes of laborers and tradespeople have their organizations. I can call to mind no other class who has not a union, and, because of our scattered locations, none need one more. Farmers, if we stand shoulder to shoulder and work unitedly for ourselves and each other, we shall soon see results.

Truly, the whole world is dependent upon us for its bread—aye, and its butter, too—so let them give us that which is ours.

As to Farmers' Clubs, I can most heartily indorse every word that Mrs. Irwin has said.

Some of the older ones among you can very well remember the debating school or lyceum of a few decades back. Of that movement—born partly of a desire for healthy amusement and partly from a deep-seated longing, which, thank God, is inherent in our nature—of that movement which seemed spontaneous and entirely without guidance, were born many of the great spirits which, as stars of extra lustre, have studded our national firmament with such extraordinary brilliancy in the last century.

Here I see something which may be made much more practical and far-reaching, for, with the united wisdom of Purdue to guide us and a well-planned outline to work from, we look for most excellent results, and hope to effect such an organization in every neighborhood in our county.

FARMERS' INSTITUTES.

BY MRS. WM. CHERRY, ADYEVILLE.

[Read before the Perry County Farmers' Institute.]

The Farmers' Institute has for its object the preparation of the people for a calling in which they are engaged and better fitting them for an intelligent exchange of ideas. Perhaps no one has received more benefit from the Farmers' Institutes than myself. The object of the Institute is to pass our experiences around and lend a hand of helpfulness, and in helping others we will be helped. You have heard the story of the numbed and chilly traveler who came on to a man almost frozen to death; he at once jumped from his seat and began rubbing the fellow to warm him up, and the effort of rubbing soon warmed himself also, and both were saved from freezing. To obtain the best results, not only in farming, but in all other pursuits, it is conceded by every true friend of progress that if agriculture shall keep pace with the other rapidly growing interests of the State, the very best talent will be in demand. The subject of Farmers' Institutes I sometimes think is not given the attention they demand; their object and benefits are not appreciated as they should be. The minds of the farmers must be developed and educated in the line of scientific farming, and it can only be done by reading and attending agricultural meetings and, best of all, Farmers' Institutes. I find by observation in the few years of experience in this line of work that the very class of farmers that the Institute act was designed for are the very class that do not attend the Farmers' Institutes. The question presents itself to the progressive farmer and the public in general—Have they observed their neglect to obtain the desired knowledge? How can we better the condition of our brother farmers? How can we get them out of the old ruts and old ideas of farming? The agricultural press has done much and is doing good service to awaken an interest, but many fail to read agricultural papers or attend any meeting where they might learn. They say they don't want any book farming. To such I say we want you with us; you can give us your experience whether of success or of failure; you can hear the practical experience of others and form plans for improvement and better work in the future. It is our duty to study our business and seek to secure a systematic preparation of the soil. We need to apply science with industry and thoughtful and timely cultivation. We are constantly warned against the danger of ignorance. Knowledge must be applied. Theory in itself is not sufficient. Practical experience will open a road to success; we must study conditions of crops. Read more and study our conditions; work less hours, read the results that are made at our Agricultural Experiment Station and the proceedings of our State Board of Agriculture.

In conclusion, let us resolve to live within our income; to be dependent of the habits and income of our neighbors, taking needed rest, enjoying ourselves royally in our vacation, bearing in mind also that a cultivated intellect is better than a superfluous bank account; make the best possible use of our talent and opportunity, and we will have more pleasure, more money and less grumbling.

DUTY OF THE FARMER.

BY E. E. RODGERS, KNOX.

[Read before the Knox County Farmers' Institute.]

Every farmer has a duty to perform. He should be a known quantity, made up of vital factors. His institutional life is the only legitimate excuse for his existence. The better he understands and performs these duties the nearer he will be in touch with the forces that will best conduce to the happiness of himself and others.

There is nothing in his vocation that puts an embargo on the duty he owes to the betterment of the political, educational, social and religious institutions of his country. Real, live, energetic business and professional men appreciate his worth. They grasp his callous hands, look into his sunburnt face to exclaim: "History has recorded your deeds of valor; you have not only fed the world, but you have done more than your part in promulgating and protecting the sacred interests of mankind."

Wherever the chains of tyranny have been broken, whenever the usurper has been dethroned and innocence and virtue set free, the sturdy hand of the yeoman was there. The farm has produced more than yellow butter and golden corn. Many a Cincinnatus, Washington, Lincoln and Garfield received his early training in a rural home. Whenever the State has measured or weighed him he has never been found wanting. There is a class of dudes and fops who, like Gulliver's wise men—one eye cocked up, the other wisely looking down—view with horror and disdain any movement that would benefit the farmer. These same seemingly wise and handsome men are not able, from their own deductions, to tell the difference between a ten-cent, pug-nosed poodle dog and a two-hundred-dollar Jersey cow. The dude stands by the wayside, adjusting a pair of gold rimmed glasses on an insulting turned-up nose; he screws a No. 4½ padded hat on a No. 3½ padded head, twirls his dandy cane, and says: "There goes a hayseed!"

It has been said that the taunts of these artificially perfumed nosegays, assisted by the cartoons of some of the larger dailies, are bringing into disrepute one of the noblest callings of mankind. The forces that are creating uneasiness and discontent must be bravely met and counteracted.

The farm has no use for the pessimist; his wailings are always out of tune. "No hope shines through his cypress trees.". There is a sunny side to farm life and all earnest seekers for truth can find it. The mechanical engineer, after handling the throttle of his locomotive for ten hours, jumps down from his cab, pats the faithful machine on its side, and says: "Good old boy, you have carried us safely over five hundred miles of road. I love you and you shall be well treated." If this man takes pleasure in praising an inanimate mechanical contrivance, how much more pleasure should a farmer take in praising his team after it has turned two and one-half or three acres of tough ground.

He that is contented with scrub stock and scrub crops either has lost or never has had the elements that make a successful farmer. Our happiness depends a great deal upon our surrounding environments, and these will be more or less as we make them. The rattle of the reaper and the hum of the threshing machine is as sweet to the farmer as the notes from a thousand pipes played for the idle king on his throne. The man that looks on the bright side of life can almost find ecstatic joy in caring for the stock on his farm. There are those thoroughbred draft horses with sinews and muscles of iron, the finely bred roadster with metal and ambition that knows no bounds, always ready to carry his master at almost lightning speed. Graded cows that greet their owner with all the courtesies that are possible from their kind. If well treated they yield the contents of their udders in such overflowing streams that the farmer or his city brethren need not suffer for pure, wholesome, delicious butter. What can be said for the porker? Not the razor-back, not the everlasting squealer, those living corn cribs, with their never-ending begging for mercy, that grates on the nerves worse than the noise that comes from the scouring of an iron kettle or the filing of a circular saw; it is the smooth-haired hide-stretcher that claims our attention, his skin almost bursting with fat. The owner, as he shovels the feed to him, may truthfully say: "If you won't realize ten per cent. on my investment, there is considerable pleasure in seeing you so happy and contented. To some a hog may be just hog, but to others he is more than a hog. The turkey, with his snow-white or golden-bronze plumage, should have his share of praise. He is very clean and industrious; his feathers are always nicely combed; he never has a dejected or shabby mien. The boy or girl that raises these birds and profits by their habits will never come to want or be found begging bread. What has been said relative to these few particular animals is almost universally true and can be applied to nearly, if not all, that are domesticated.

Small pity for the man that will not try to raise better animals and crops this year than last. Let progression be the watchword of every person that tills the earth. Let him go to his flocks, his herds, his fields, although ever so large or small, with the determination that each succeeding effort shall be crowned with better success than its predecessor.

Point out a successful business man and one will be found that attends strictly to his business. Point out a successful lawyer; he will be found in his office, carefully reading such books and papers as will best aid him in his profession. He is never found playing "jack straws" or any other game for the drinks.

If farmers would be successful they must look to the stake ahead; hold tight to the handles, and never look back; but plow straight to the mark.

Listen, my friends: As long as "chill penury" is the primary end, so long will the barnacles cling to the agricultural boat and hamper her in dock and at sea, but let truth and beauty step aboard, then "all things shall be added unto her." These slimy parasites will slip from her hull; she will glide gracefully over the shoals; her streaming banners will declare a closer union between man and his Creator.

Agriculture, with its attributive studies, offers to the student of nature a splendid field for search and conquest. If the botanist and florist had been satisfied with plain and homely flowers and fruit they would never have made a study of grafting, budding, hybridizing and cross fertilization. As civilization advances man becomes tired of the old and demands something new. The old single, one-colored flowers do not satisfy his longing; he desires something more varied and complex; he looks and longs for the ideal. He cries for more light and beauty; his efforts are successful, and he manipulates his power so as to bring forth the parti-colored rose; he casts his mind heavenward, unlocks the storehouse of beauty and sprinkles the rainbow colors on the flower world. The little plain-dressed Johnny-jump-up is changed into a pansy, with cheek softer and more velvety than that of any queen or princess. They were beautiful in their native wildness, but who dare say that they are not more beautiful after the hand of man has been there? Has he the right to glory in the work he has accomplished? Does man live to finish the unfinished, to make the beautiful more beautiful, thereby pleasing his Creator and himself? Will evolution allow him to use his God-given qualities to further his own happiness? The optimist says, "Yes; man lives for those who love him and the good that he can do."

The pessimist who lives in squalor and is always wallowing in the slime and filth that his own pores exude wails out: "I live to suffer the slings and arrows of outrageous fortune—life is but an empty dream, and it does not pay dividends on the investment. I am suffering terrible agony and pain for the sin committed by father Adam, and know that the mark of Cain is on my forehead; more especially am I reminded of the fact when I take my spade and go into the garden to make a small bed for early vegetables, for Cain must earn his bread by the sweat of his face."

May the Lord have pity on such men. This world has no use for them, and surely they will be a curse to the next. But back to the subject. While the botanist and florist were creating a new world of flower and fruit, what were the breeder and farmer doing? They have changed seven and eight-inch hog bristles to hair almost as glossy and as fine as fur. They have bred from the heads of cattle and sheep enormous horns. Cows fifty years ago averaged less than fifty pounds of butter annually, but to-day three hundred pounds is no uncommon yield. Twenty years ago a two-minute horse was not dreamed of, and a man would have been called crazy to have predicted such speed. These achievements were not brought about in a single day, but took years of constant labor and thought.

These conditions were brought about under many difficulties. There are too few that make a specialty of any one business. Man, as a rule, has too many irons in the fire; he is prone to carry too many side lines. He had better be a master of one trade than a Jack of many. No Pingree or Booth or any other person has a moral right to convert vacant city lots into cabbage and potato patches. These eccentric would-be philosophers rob the rightful persons, the farmers, of a great deal of the fruits of their labor. Every peck of beans, every head of cabbage, every bushel of potatoes raised within the city limits destroys so much of the farmer's income. These persons could better serve their fellowmen by devising means by which the city laborer could earn a sufficient competence to buy his produce of the farmer, the only person entitled to raise it. What would be the effect on the future destinies of the cities if the farming communities should organize and manufacture all articles now bought through the trade? It would only be a short time until they would be lifeless; desolation and despair would sit on the housetop and mourn for their departed ambition. This is no argument for such a condition; on the contrary, it is against it. No farmer has a right to interfere with other vocations. He has no legitimate permission to shoe his own horse; neither has the blacksmith a right to raise a hog.

Not long ago the following dialogue took place:

"Well, John, how are you this morning?"

"I am feeling somewhat blue. You know I have five sons, all of whom are nearly grown, hardy young fellows as you would wish to find. Either would make a successful farmer. Four of them told me this morning that they intend leaving the farm."

"I see nothing in that to make you feel blue."

"Yes, but don't you know that our agricultural papers and institute workers have been devising means whereby we could keep the boys on the farm? I was in happy accord with them and was endeavoring to the best of my ability to accomplish this end."

"What did the boys say their intentions were?"

"Well, James has marked out for himself a law course; Frank expects to study medicine; Henry already has a place as a clerk, and worst of all, that rattled-headed Tom is going to the Klondike. But John expects to stay on the farm with his father."

"My friend, I see nothing serious in the fact that the boys have concluded to leave the farm. Only last Monday night, in the Grange, I heard you say that it was the farmer's duty to feed and clothe the world; now, why do you wish to keep five boys upon an eighty-acre farm when you and John can manage it yourselves? My advice would be to bid those boys God speed, charge them to be upright and good citizens, also remind them that John and his father will have plenty to eat at the old stand at very reasonable prices."

"I feel, neighbor, that you have given me good and wholesome advice, and I will govern myself accordingly."

My friends, I will ask you to pardon a personal reference. I feel sorry that we as farmers do not better understand our condition. There is one thing it seems to me is more neglected than it should be, and that is our education. Why should this be? Who can answer this very serious question? Why do we so utterly neglect the thing which would best work us happiness? Every boy and girl should be able to read understandingly the masterpieces of literature, and more especially those of America. Search for the gems of the world's best, and most of them will be found to embody country life. The sweetest notes of Burns were sung along the stream and in the wood; Gray went into a country churchyard to find the germs that might have ruled the world. Bulwer Lytton studied and polished the aristocracy of Europe, but when he wanted a true-hearted hero or heroine he went to the country to get it. In the hurrying and scurrying and jumbling and rumbling of the city could never have been born such beautiful poems as Evangeline or Snowbound. When Lowell wanted to open the heart of man and cleanse it of its dark spots, whenever he wished to sift and screen the soul, he took a country place to perform these cleansing operations.

Hundreds of such cases could be named, but it is not necessary. Every farmer's boy or girl is entitled to better educational facilities. They should have equal opportunities with the city children. Who is so base as to deny them a high school in every township?

Yes, but, says one, it is muscle and everlasting grit and sticktoitiveness that makes the farm go. The sticktoitiveness is all right but an abnormal muscle is not altogether necessary. Success depends more on brains and horse sense than anything else. Every farmer should be able to make a chemical analysis of the soil and subsoil of his land. He should be able to feed this land whatever it needs to bring forth good crops. He ought to be capable of understanding germination and pollenization. If the boy goes into the corn field knowing the wonderful plan of nature, by which every kernel gets its tiny bit of pollen; if he can look at the silk and know that they are the conductors of the life-giving elements; when he understands the beautiful plan of nature, then, and not till then, is he able to farm as his Creator desired.

One more plea for higher and better education. The farmer is one of the most potent factors in the State. He controls more capital than all other interests combined, but it is an appalling fact that he is represented in Congress by less than a score of simon pure yeomen. Give the boys a liberal education and this vast moneyed interest will be amply represented in Congress. Then, when a currency commission is called, sitting with Brice, Hanna, Morgan and their crew will be found such men as Aaron Jones, James Mount and Claude Matthews. Will it pay to educate the boys and girls? Does the farm pay? If properly handled it does. To prove this assertion it will be necessary to cite only one case. Less than fourteen years ago a young man with but little of this world's goods started to do for himself. There has not been a dishonest act marked against him. By careful management, without eating at the public crib, by having a bright face through sunshine and shadow, he has won the respect of all who know him and especially those who know him best. His property will schedule close to $12,000, and all this has been accomplished with one arm. The question again comes: "Does farming pay?"

IMPROVING ONE'S OPPORTUNITIES.

BY MISS TENA FOLTZ, KNOX.

[Read before the Starke County Farmers' Institute.]

Ladies and Gentlemen—Having an opportunity to mingle with you in a Farmers' Institute affords me much pleasure. Four years ago, on a like occasion, I was asked to write a paper on "Advantages and Disadvantages of Farmers' Daughters." A short time ago I was requested to prepare one for to-night with no subject assigned me, so I have written these, giving them no name. If, after hearing them read, you think them worthy you may give them one.

What is more beautiful to look upon than a green field of waving grain? What is nicer than a pretty lawn or grove? What more enticing than an orchard with its delicious fruits, the vineyard with its luscious grapes or a garden with its tempting products?

What artist can paint a scene more magnificent than a beautiful farm? Who can enjoy more freedom or better health than he who tills the soil?

Farmers are the most independent class of people on the face of the earth, or at least they should be. If we should fail in farming there is no law to bind us to it. We admit there are some disadvantages connected with life in the country, but the many advantages and pleasures far outweigh the comforts of the average city dweller.

Farmers are said to be natural gamblers. This may be true of scattered individuals; but if applied to farmers as a class the saying is a gross libel on them. Maybe everybody is his own fortune's architect, but I believe in a much truer sense everybody is the manufacturer of his own happiness.

Happiness does not come from outside, is not dependent on riches or worldly success, but comes from within and is simply a state of mind and therefore a condition which can be cultivated or acquired by habit.

Now, farming is a business of varied character and minute details, and requires tact and education. Dissatisfaction and discontent are very desirable when accompanied by energy enough to lead to striving for better things. And the man who says, "This condition does not suit me, but I mean to make it better," and has the grit to carry out his intention is in the path of progress and is liable to get well along in it if he lives.

No man can make a success in life if he does not work. He cannot loaf around in stores, saloons and at street corners without deteriorating.

He must learn a trade or do some honest work. Do something, no matter how small, and do it well and he will eventually find himself climbing the ladder of success.

There are scores, I might say tens of thousands, trying to attain to elevations by stunning smartness and wit. Every city and town have young lawyers and other business men without employment who had better be spading the garden or milking the cows for a livelihood.

I was called to these thoughts by reading of a young lawyer who had studied law as a means to mount the ladder of fame. He had been admitted to the bar, but by his "sounding brass" and lack of judgment and merit was driven from the profession. Now, like many a similar young man, he is getting his living by visiting and in almost any way he can, but not by taking up the shovel and the hoe, the only implements which he was qualified by nature to use.

This country is not in need of more polished heads and idle hands. Its most crying need to-day is for skilled workers, for men and women who care more to be useful than ornamental.

Some one has said: There is no use trying, we cannot rise above the stomach. We must live, and we must eat to live, and some one must do the work that living demands. And those people who will not lend a helping hand, but willingly prey on their hard working relatives, are a disgrace to modern civilization.

The trouble is too many people are too desirous for easy places. They will do the eating if somebody else will do the cooking. They will pay the bills, too, if somebody else will earn the money.

Figuratively speaking, too many people waste their time waiting for their ship to come in when they originally omitted to send one out. No employment can drag a true man down to a lower level, but he may lift an honest, honorable employment to a higher level.

The one great question of transcendent importance is character. Take care of that and let your reputation take care of itself.

No matter how well off you may expect to leave your children, it is a good thing to have them learn some kind of a trade thoroughly, so they may have something to resort to if adversity should come to them. A man never yet found it a disadvantage to know how to use his hands skillfully, and he will have more self respect in feeling that there is one thing at least he knows how to do well.

Furthermore, if you give your boys and girls a good education, you give them something that is worth vastly more than a thousand dollars or a good farm. It is something they cannot easily lose, that cannot burn up or be spent. The sheriff cannot seize it. Good schooling, coupled with good sense, is worth a fortune in itself.

When thus equipped, whether he has a dollar or not, he can soon command a competence and independence. Poverty deprives many of education, chances and advantages. But when well-to-do farmers subordinate everything, even to the education of their children, to their desire to hoard money, when they keep their children at farm work rather than at school, they make a grievous mistake and do their children great wrong. By this act their children acquire a greed for wealth, and many are lured to the cities by the idea that wealth and happiness are there much more easily obtained. In some instances their hopes have been realized, while in many they have found that wealth does not come for the asking and happiness is not very deep where mingled with poverty, cold and hunger.

If children only knew that by leaving a home with sweet associations they would probably ninety-five cases out of a hundred only meet with discouragement and temptation there would be more contentment around the fireside. It is true they may not have work for every day of the year at good wages, but if they are industrious they need not be idle many days.

Then, too, they need have no fear of strikes or lockouts, through which many are thrown out of employment for months, during which children cry for bread, and thin clothing refuses to keep out the cold. Did you ever hear of a farmer's family starving because there was no work to be done? There is room in the country for many able and willing people who can earn a good living and enjoy comparative independence, and the fresh air, bright sunshine and free exercise are more conducive to health than the smoke and dust of the city.

Let farmers forevermore be honored in their calling. Let every farmer keep his shoulder to the wheel and be proud of his vocation. The soil is the heritage of the people, and its products are the source of all wealth and luxury. In fact, they are the grand exchequer of the world that honors all drafts and is its source of life itself.

Let us ever remember that for health and substantial wealth, for rare opportunities for self-improvement, for long life and real independence, farming is the best business in the world.

INTENSIVE FARMING THE SOLUTION OF THE RENT PROBLEM.

BY S. T. STEPHENSON, LEBANON.

[Read before the Boone County Farmers' Institute.]

It is admitted by all economists that general prosperity depends upon agricultural prosperity, and the best political economy for this country is that which best advances the agricultural interests, because by establishing the prosperity of the American farmer normal and legitimate protection will have been secured for the American manufacturer, for his best customers are farmers and those engaged in occupations which depend upon the prosperity of farmers. This our government is doing by having established a Bureau of Agriculture, giving aid and support to the experimental stations in every State, which stand as sentinels on the outposts guarding our interests along this line.

We as a people who produce a large surplus of agricultural products are in a contest for feeding and supplying mankind, and in this we are met with fierce competition from all over the globe. Cheap and rapid transit has brought the markets of the world together, "and no one is far from market except he who has nothing to sell." Wheat can be transported from Indianapolis to Liverpool for fourteen cents per bushel, about as cheap (as many present will remember) as the same could have been conveyed from this vicinity to Lafayette forty years ago. We live in an age of electricity and steam, and in this struggle it is country against country, industry against industry, agriculture against agriculture, and while it is something to be thankful for that the workingman can obtain cheap food and cheap clothing and the fears of horrible famine have been dispelled, yet it has brought about the general lowering of prices until it has thrown the cultivators into confusion and brought discouragement to the rural population.

Such is the condition of affairs that confronts us, and we as farmers, not only renters, but those who own and till their lands as well, must study the situation and solve if possible this difficult problem. But coming more directly to the question, the solution of the rent problem, it is a well-known fact that the condition of the renter to-day in Boone County is not satisfactory either to himself or his landlord.

There are but three ways by which his condition could be bettered—by a general and permanent rise in prices, by lowering his rent, or by producing more for the labor and capital expended. That there will be no relief in the near future from the first proposition may be inferred from what has already been said, except when there is a great shortage in the world's supply of some commodity, as in wheat at the present time, and this is as apt to be against us as for us, and therefore cannot be relied upon. Can we lower the rent? Farm lands rent in this county from $3.50 to $4.50 per acre. These lands are worth from $40 to $60 per acre. Taking the mean and we have interest on investment at 8 per cent., $4; tax, 75 cents; temporary repairs, 25 cents; total, $5; rental value, $4. We answer the question in the negative, at least until there is a marked shrinkage in the amount invested in these lands.

The general average per acre of the great staples in this country is much lower than it ought to be, and it is reasonable to suppose that it may be greatly augmented if fifteen bushels of wheat or thirty-five bushels of corn per acre will pay expenses on these rented lands, then thirty bushels of wheat or sixty bushels of corn will produce a handsome profit, and these in this county are easy possibilities, not attained, however, by luck or moon signs, but by well-directed labor, the enriching of the soil and thorough tillage. The renter who raises thirty bushels of wheat, sixty bushels of corn, four bushels of clover seed, two tons of hay per acre and sells his pigs at eight months old, averaging 260 pounds, is succeeding well unless he has been very unwise in some other direction. Intensive farming will solve the problem, but time forbids me pursuing the arguments farther, but I desire to make a few suggestions that will aid in accomplishing the desired result. Let the renter obtain longer leases, three or five years. This will enable him to lay his plans for the future, rotate his crops, breed the kind of live stock best suited to his environments, save and utilize his manure, husband his home resources, diversify his crops, etc. Keep the premises neat and tidy; don't be afraid you will hit a lick in the interest of the owner for which he has not agreed to pay you; protect his interests; secure his respect by honest, manly and prompt discharge of all your obligations to him, and when your lease expires he will be ready to contract with you on better terms. Make thorough preparations for every crop. "What is worth doing at all is worth doing well." Plant in the proper season; cultivate from start to finish; remember that tillage is manure. Till to liberate plant food; till to preserve moisture; till to destroy weeds. You can not raise two crops on the same ground at the same time. Don't undertake too much; use the best of tools and take good care of them; if possible, don't spend your money till you have made it; buy nothing that you can reasonably get along without, for under existing circumstances the strictest economy is the farmer's only safeguard. Do the best you know and learn how to do better. Read the agricultural press. Study the station bulletins. Don't spend too much time in town or at the crossroad blacksmith shop or leaning against the partition fence talking to an idle neighbor. Use plenty of push and elbow grease. Do your best, and the problem will be solved by a more bountiful yield of the farm and more of the luxuries of life for the tenant and his family.

FARMERS' FAILURES.

BY C. W. BRUBECK, GEORGETOWN.

[Read before the Harrison County Farmers' Institute.]

Mr. President, Ladies and Gentlemen of this Institute—Failures to the farmer may be divided into two distinct classes. First, he may fail to establish a happy and congenial home, where the environments will not be to the ennobling of the true virtues of manhood and womanhood.

Or he may fail from a financial standpoint caused through negligence and the want of applying business methods. And with the exception of a few thoughts I'll treat only of the latter. First. What are we to consider a failure in farming; or where are we to draw the line of failure and success? The merchants have a statistical report of their fraternity that places nine out of ten in the failure list. But I know of no definite statistical report that divides the successful farmer from the one that may be determined a failure, and you must therefore make your own decision.

If you are moving from year to year in about the same channel, without any noticeable ascent to you, you have most likely fallen into an old rut of indifference and negligence, and it is high time to begin to unravel the mystery by a careful study of your business methods. First look to your surroundings; see if your branch of agriculture is suited to the environments of your location. Is your soil in proper condition to grow the crops you are trying to grow, and are you in proximity to a ready market that will afford you profitable prices for the products you have grown?

If the trouble does not lie along these lines it is doubtless traceable to non-business methods. Farming within the last few decades has had a wonderful page of advancement, and is now recognized only as a profession, and one that not only requires muscular labor, but takes every square inch of intelligence, well and closely applied.

I believe nine failures in ten are solely caused by not having a well prepared set of outlined business principles; a high aim to work to; and the energy to push with all the ability you have. It is impossible for the farmer to make a success who does not have his business planned at least one year ahead. Plan for the utilization of every foot of land you have; know what is to be your money crop and plan for the maturity of the same when the market will not be overstocked.

The failures of many farmers are caused by their inability to place on the market the products they have grown for their real value. For this there are in the main three causes: First. By not placing the article before the customer in a way that will attract him to buy. Second. By not having the nerve to hold the article until the market is in ready demand. Third. By not keeping apace with the market reports, so that you will know just when to sell.

A STUDENT IN GENERAL.

In order to be a successful and progressive farmer you must be a close student. Take two or three of the best farm papers that cover the field in which you are laboring. Study the experiments that are accurately carried out at our experiment stations; get the facts, and compare them with your results of different methods.

TECHNICALITIES OR MINOR POINTS.

Possibly one of the greatest failures to the farmer is caused by overlooking the smaller points, which invariably go to make the masses of your future gain. This may be in not giving proper tillage to the crops you are growing; or possibly by leaving your machinery (that has cost well earned money) where last used, exposed to sun and rain to rust and rot out; or it may be the commercial fertilizer bill could be reduced one-half by a better saving of the barnyard manure; or possibly by not giving proper care to farm animals you are growing for a later market. In these times of close competition and small margins the neglect of one or all of these point is sure to prove a disaster to the financial result. My observation has been that the finishing touches always determine one's future success or failure.

FADS.

The American people, especially the farmers, are a people of fads.

When they see one branch of industry that temporarily pays a better margin than the one they are pursuing, the first thing is to go pell-mell headlong into a fathomless abyss, and then, to their sad disappointment, find that all others have followed in hot pursuit, and, using a common phrase, the bottom of the market has fallen out.

As an illustration I cite you to the horse, beef and sheep markets.

But recently the craze of rearing horses everywhere was the order of the day, farmers breeding without discriminating between the scrub and high-class horse—breeding without an object—in the end seemingly only to get a thing in the shape of a colt.

Results: The country soon became filled with good, bad and indifferent horses; and this, together with other objectionable causes, reduced the value of the horse below the cost of production. But where is the colt crop to-day? The reports from everywhere show the crop to have diminished almost from sight, and the note of alarm is already sounded of a scarcity of real toppy horses, and they are demanding a toppy price.

Beef but a short time ago was running at a low ebb of profit. Farmers and breeders everywhere begin to turn their attention to other interests (dairying principally)—the results to-day, a scarcity of beef, hard to find, still harder to buy on account of long prices, and almost impossible to get stockers and feeders at any price to fill the demand.

The sheep industry is also typical of the others named, and that once profitable farm animal-raising that has possibly brought more money to the owner for the amount of labor and money expended than any other branch of animal farming is now crowded to the wall or in the hands of a few by the fad or fashion of everybody selling at once.

Mrs. Hettie Green, credited with being the wealthiest woman in America, when asked, a few days ago, what she attributed her financial success to, said: "I do not know; I only use common sense; I sell when everybody wants to buy and buy when everybody wants to sell." She said: "I believe this is the true keynote to success."

In the past I've spoken something of the necessity of being able to make judicious sales. We now pass to the buying side of the question.

The merchant will tell you that goods well bought are half sold—while the farmer realizes that one dollar saved is one dollar made.

Admitting it is absolutely necessary to have a well equipped line of tools and machinery to carry on your farm labor in a business-like manner, it is right to own a good carriage for the convenience of yourself and family, and a duty—an honor—you owe your family to provide convenient surroundings and a well furnished home just so far as you are financially able. But I feel it to be an injustice to this subject not to speak something of the unbusiness-like habit of far too many farmers—of buying articles carried over the country by agents at long prices, that are claimed to be something new, and that you could not possibly get along in the future without it—is a failure. a weakness, of yours. Better judgment to say no.

But recently a new firm introduced in this county a two-wheel attachment for plows, sold through agents for at least seven times their cost of making, taking a good note for ninety days and discounting same at nearest broker for about one-half. That one firm alone took thousands of dollars from the farmers in this county by that one useless article. I saw one sell in a few months after purchasing for less than 12 cents on the dollar of first cost.

One of the safest rules I know of in this is to never buy goods carried over the country by agents; the business man who has done the bulk of your business is the safest and cheapest man to deal with, unless you can buy direct from the house, which is always the best. By doing this you will have less trouble in getting future repairs, and have fewer future failures.

SOME THINGS THE FARMERS NEED.

BY DR. H. S. WOLFE, NEW ALBANY.

[Read before the Floyd County Farmers' Institute.]

Of all the working classes, the farmer has need of the greatest intelligence. Indeed, there is no pursuit among men at the present day which calls for more thought and skill than agriculture. This may be established by many considerations. In the first place, the farmer of to-day is surrounded by hard conditions and is laboring under many disadvantages.

A mere glance at the true situation will suffice to satisfy any one that such is the case. Falling prices, continuing through a long series of years, have at last made it very difficult for him, under ordinary conditions, to make his income meet his expenses. A few farmers, it is true, are making money; some are making a living, while very many are actually falling behind. In most instances land is failing in fertility, and in every branch of agriculture competition has grown sharp, and is constantly growing sharper. The great multitude of small and medium farmers are being pushed to the wall by the facilities in many localities for the use of machinery on a large scale; and thus, while the few are succeeding, the many are suffering loss.

But this is not all. While conditions have been growing harder, and prices have continued to fall, the "fixed charges" that the farmer is required to pay have not only in the main not declined but in some instances have actually been increased. Taxation, the salaries of public officials, the fees of professional men, rates of insurance, cost of transportation, and many local or minor charges, either remain at the rates fixed when agriculture was not depressed or have been actually increased. These things work a great hardship and are exceedingly burdensome.

But, hard as it is, and unfair, even this is not all, nor the worst. The farmers under our system of taxation pay an unfair proportion of the fixed charges alluded to. He pays more than his fair proportion of taxes. The blank schedules furnished by the assessors require the farmer to enumerate separately, by name and number, each article he owns, so that nothing can escape taxation, while many items of personal property owned by other classes are not so specified, but are included in a single line, thus leaving a wide-open door for fraud, through which many enter to the farmer's injury. Look at the blank the assessor will soon leave you, and you will see that the questions addressed to one class are general in character, while those affecting the farmer are specific. For example, questions from two to eight are in this form: "All money," "All interest," "All judgments," "All shares of stock," etc. Now the questions addressed to the farmer are not in this form. He is not asked to list all horses, all mules, all cattle, etc., etc., but is required to state the number of each one that he owns separately, and then the value is fixed for him by an outside party. All the questions, or nearly so, from No. 41 to No. 94, are designed to secure, item by item, every conceivable thing the farmer owns—his wood, his coal, his grass seed, his fruit, his pork, beef, sorghum, cider, etc., etc.—naming everything specifically and in the most painstaking detail, so that nothing can by any possibility escape taxation. He is not permitted to list his property in a lump as "value of all," farm products, as the merchant or trader does his as "value of all goods and merchandise," and this, as said before, affords an opportunity to escape a just proportion of the burdens of taxation. The hardship is not that the farmer should have the same opportunity for fraud, but that the other fellow has the opportunity afforded him by law, and actually often uses it to the manifest injury of the farmer.

Besides this, the farmer's possessions are largely in real estate, or personal property that cannot be concealed, while on the other hand the possessions of the banker, and merchant, and professional man, etc., etc., are mainly in a form of personal effects which are out of sight and easily concealed, and needing no advantage in law, and are listed, if at all, in a single line, in answer to a single question, and much of it thereby escaping taxation altogether. All this, and much more, shows conclusively that the conditions under which the farmer is laboring are indeed hard, and he will need great intelligence and wisdom if he ever overcomes them.

The condition of the farmer is often made worse, too, by the manner in which he conducts his business. His work is often not well or wisely done. The farmer should know more about the principles of agriculture. Farming is not all drudgery, but is a business that affords a wide field for the exercise of the highest order of intelligence; and yet it is a lamentable fact that there is no class of business men on earth who make so little effort to understand their business as the average farmer. The employes of a great manufacturing establishment, the mill hand, the mechanic, must all know their business in order to hold their places, and so they do know their business, if they know but little else. The merchant and professional man, as also the day laborer, hold their places upon merit, while the farmer, owning his own land, needs no merit to hold his place, and so many of them hold it without merit. More headwork in his business is a prime necessity, and this he needs not only because he does not do his work wisely or well, but because he has to do with the greatest business on earth. Pause for a moment and consider the magnitude of agriculture.

What a vast amount of labor and money are engaged in this greatest and grandest of all human pursuits. Look at some of the items of this wonderful business separately. There are in the United States 4,564,000 farms of 137 acres each, or 625,268,000 acres in cultivation—a sum too vast to be comprehended by the human mind. The productions of these acres are quite beyond comprehension and almost beyond computation. The value of poultry and eggs alone, in 1890, was $290,000,000. The value of horses, $500,000,000; of wheat crop, $238,000,000; and of cotton, $359,000,000—to say nothing of corn, oats, hay, wool, sheep, swine, cattle, tobacco, etc. For the year ended June 30, 1897, the exports from this country of farm products alone amounted to $638,878,990, against only $348,122,410 for all other industries put together—or about two-thirds of all our exports for agriculture alone and only one-third for all other exports combined.

The Rural New Yorker of recent date (November 13, 1897) gave some statistics which grandly show the greatness of the business of agriculture. It says: "According to the latest estimates there are 3,454,673 farm laborers in this country. Their average wages outside of board are $105 per year, which means $365,740,665 annually paid for farm labor. "The farm hands, if they would pool their earnings, could pay all pensions, all school teachers, and all farm mortgages and have enough left to outbid the Morgan syndicate and buy the Pacific railroad." The following table shows what was paid workmen as wages in some other lines of work:

Blacksmiths, etc.	$26,796,927
Boot and shoe workers	66,375,076
Bakers, etc.	28,789,047
Carpenters	94,524,197
Clothing workers	111,389,672
Cotton mill hands	69,489,272
Foundry and iron workers	148,389,063
Furniture workers	43,054,948
Masons	77,529,287
Printers	105,083,075
Tobacco workers	44,726,989
Total	$815,888,553

These wages are supposed to cover the cost of living. The farm hands received their $362,704,665 in addition to their board. At a low estimate this (with washing and lodging) was worth $125 per year for each one. To make a fair comparison with the wages paid other workers we may safely put the hired man's yearly account at the sum of $894,584,790, or $78,696,237 more than all the blacksmiths, all the shoemakers, all the bakers, all the carpenters, all the clothing workers, all the cotton mill hands, all the foundry and iron workers, all the furniture workers, all the masons, all the printers and all the tobacco workers put together. Such is the magnitude of the business of farming. Is it not clear that agriculture is the greatest business on earth and that the farmer accordingly needs the greatest degree of intelligence to properly and successfully conduct it?

Now so vast and valuable a business as this is not overlooked, and never will be, by the avarice and greed of mankind, and it is true to-day that the shrewdest men in America and the world are banded together for the single purpose of fleecing the farmer out of these enormous earnings. Such a rich field for his operations affords an irresistible temptation to the money shark, and there is accordingly no devilish scheme to be thought of that is not put in operation by the crafty money manipulator, by which he hopes to secure the lion's share of the vast products of agriculture.

Boards of trade, so-called, are organized in the principal business centers, composed of the brainiest of men, whose chief occupation is to control the prices of farm products to suit the individual interests of the bulls and bears. Railroads have their traffic associations, composed also of the shrewdest of men, for the purpose of fixing transportation rates on farm products in their own interest, and the rates are accordingly often fixed so high that the company gets more for transporting the article to market than the farmer gets for its entire production. Express companies in like manner charge rates often greatly in excess of the service rendered. Only recently I purchased twelve pounds of rape seed in the city of Chicago, which had been imported from Europe and sold to me for one dollar. The express charges on the same from that city to New Albany was sixty cents, or more than half the cost of the seed after its production and after paying freight from Europe. And so it is all along the line, and upon everything the farmer has to do with, whether he either sells or buys. The farmer needs a vast amount of intelligence and energy to meet and successfully compete with such combinations as these. Shylock is indeed thoroughly organized and watching the vast productions of the farm as the vulture watches his prey, and yet in the face of this undisputed fact the farmer himself is dozing away his time in the vain hope of a better day; a hope that will never be realized unless he awakens to his own interests and refuses to be led by others. There is no mercy in the bosom of the foe the farmer has to meet.

The farmer, therefore, needs to read more. Reading matter of the choicest quality can be had at a very low price. The best of our farm weeklies are offered at only one dollar a year, and in clubs at even a lower rate. The agricultural department at Washington prints much valuable matter for farmers without price. And our own experiment station at Lafayette is doing all it can to force the choicest matter upon farmers, if they would only receive it and read it. All these publications are of the very highest importance to farmers, and would surely lead them out of the old ruts and into a better way, if only used. It is truly deplorable to see the great business of agriculture butchered as it often is, and the honest farmer made the hewer of wood and the drawer of water for merciless combinations, when the means of relief are almost without price laid at his very door.

The farmer must think more as well as read more. And thinking more will surely make him read more. He should awake from his lethargy and ask himself these questions: Why do I do this in the old way? and why don't I do that in the way bright men say is so much a better way? And he should hold himself rigidly to these important questions till he has wrung from himself an answer that will satisfy him.

Farmers should experiment more. There is no doubt but a trial would induce him to make great changes in his ordinary methods. A system of neighborhood, or club, experimentation, where several persons would conduct the same, or different experiments, and make due report of their work to each other, would in one season demonstrate what is best in any given line for that locality. For example, let each of ten or more farmers purchase one of the new varieties of potatoes, and each cultivate them under the same rules, and exhibit the product at the end of the season; all could then see at once the best potatoes for that neighborhood. And so in very many other things. What a valuable and surprising amount of information could thus be gained in so short a time and so easily.

I have only time and space to briefly mention one other great need of the farmer, and that is organization. Intelligence, reading, deep study and the most extensive experimentation, however good in themselves, are not sufficient to meet the requirements of the farmer's case. The farmer is confronted with organized foes upon every hand and he cannot hope to hold his own in their presence without counter organization. The farmers of the United States should be organized into one compact national body such as the Grange presents, and without some such organization he must continually be at the mercy of organized greed. Organization is right when effected for a right purpose and it is only in this way that large bodies of men at this day, such as the farmers are, can hope to secure or hold their own. What organization is to others it would surely prove to be to farmers. Capital and labor everywhere else are organized in their own interest, and what wonders these organizations are accomplishing. No outside question of politics or religion or other than the pure business of the combine is permitted to influence them against their own interest. Even the saloons can meet together of "one accord in one place" and, agreeing upon the one matter of their business, lay all other considerations aside. Why, then, should the farmer be the only fool in America? Why should they allow anything to distract them in the management of a business greater than all others put together? Why should he continue asleep, or, waking, should only "beat the air," while avarice and greed pockets the proceeds of his honest toil? I repeat, why? And every farmer should stop and answer the question to his own intelligent satisfaction.

In conclusion, I repeat the two great needs of the farmer to-day is more head work in his business, and closer organization for his protection. Given these, and almost every ill that now afflicts him will vanish as the mists before a noonday sun—without them he remains the victim of the shrewd men and the organized forces arrayed against him.

THE FARMER AS A CITIZEN.

BY S. B. WOODS, LATTAVILLE.

[Read before the Lake County Farmers' Institute.]

We have here in our Institutes talked over the conditions of the farmer in almost every conceivable manner pertaining to his interests except the position he holds and his interest in citizenship. He is an important citizen. He is the foundation, the underpinning of our national as well as our State and county prosperity. He and his whole family as a rule are continually producing something, whether it is high or low in price. If we can't get $5 per hundred for pork we make it for $3. If we can't get $1 per can for milk we make it for 75 cents. If horses don't bring $150, we sell them for $50.

There is no agitation between capital and labor. We are both capital and labor. We accumulate and make the solid wealth of the country. We live within our means; we don't go on the temporary relief list. You don't see many of our names on the delinquent tax list. You don't see our merchants with a big account against many of us.

If we have to, our whole family's clothes won't cost more than it costs to dress some of the 16-year-old girls in town. It is this economy, this living within our means, which makes us what they call "an independent farmer."

If we and our boys and girls would work as little, spend as much money for clothes and pleasures as some of our town people it would not be long before our independence would be gone. The United States last year furnished fifty-seven per cent. of all exports of the world and most of that was agricultural products. Some of our political friends claim that the politics of our country has much to do with its prosperity. It probably does make a difference, but I have always noticed that when we get a right lively good time here it is when the old world wants something to eat and the American farmer has something to sell. The main stay of the United States is its agricultural products. It starts the wheels of commerce; it brings the balance of trade in our favor. When the farmers turn loose their wheat the gold comes out of its hiding and confidence is restored. The dairy output alone in the United States reaches the enormous sum of $500,000,000 annually. More than all the money in all the banks in the United States. Would you believe it? It is true. The American farmer has done wonders; but he has his weak points and we will have to enumerate some of them. In the first place he is not a very social creature; he has become so accustomed to staying at home and working that it has become second nature to him; he don't go to church or Sunday school with his family as much as he should; does not visit the school and take an interest in the education of his children as much as he should; does not take his wife out to the neighbors and friends as much as he should; does not attend agricultural meetings—farmers' institutes—as much as he should; does not attend township caucuses and county conventions as much as he should; does not attend any and all meetings held which determine, ultimately, the welfare of the nation, as well as the farmer, as much as he should. If he does go he very seldom has anything to say at the meeting. He will sit back while the other fellow does all the talking and controls the meeting to suit himself, and then the farmer goes out and gets around behind the barn with some neighbor and there he will talk and swear a blue streak, claiming the thing was not run as it should be and if they don't run it differently from that he won't have anything to do with it.

There are many farmers in this county who say they don't like the way the fair is run, and you could not get one of them to come to a business meeting of the fair unless you would put a log chain around their necks and pull them up with a span of horses. And after you got them there it would take a charge of dynamite to get them off their seats in the meeting.

They do not obey the Bible when it says, "Do not hide your light under a bushel." Or where it says, "Let your light so shine before men that they may see your good works and glorify your Father which is in heaven." This Institute could be attended by every farmer and his family in the county with profit and pleasure. But see how few take advantage of it. In their politics too many of them vote the straight ticket, not knowing, and a great many not seeming to care, whether it is to their interest or not. They belong to that party and they take pride in going it straight, when, in my opinion, the independent voter is to be the salvation of this country. The men in politics are in it the same as I am in the milk business—for what there is in it. And as to the right and wrong of the thing they are not losing any sleep over that.

We have the finest country, in this United States, that God ever made, and every man, woman and child in it could live like kings and queens and not work over eight hours a day if everybody did what was right. But if people won't voluntarily do what is right we must have laws to make them do as near right as we can. Do you think this condition of things will be brought about by the thickly populated cities? Never! We must look for the real, practical Christian politics from the farm and the farmers. The farmers are away from the corrupting influence of ward politics. They are property holders and have something at stake. They must be the independent voters that vote for the right and not for the party. And it is their business to inform themselves and know what is right, just as much as it is to raise corn and hogs.

Let the farmers come together and work for their interest and the interest of the country. Farmers will come together in a common cause, but they don't stay together. I was up to Chicago the tenth of this month and heard Mr. Miller, secretary of the Health Department of Chicago, talk to the milk shippers gathered there, and he said: "If you will only stick you are doing a noble work. The amount of good you are doing the farmers and milk consumers of Chicago is immense." He said: "If you will only stick you can purify the milk business of the city. God grant it. But if you do stick, it will be the first farmers' organization that ever did."

The Standard Oil Company sticks; the Big Four sticks; the coal companies stick. Most everyone but the farmer has an organization to look out for his interests.

We are between the two millstones and seem to have pretty good grit too, for we don't squeal very much where anybody hears us. If we elect a man to congress or as a State representative we generally vote for somebody who is not a farmer, for we generally think that a farmer don't know enough to know what we want. But the other fellow generally knows what he wants and he goes after it.

We farmers as a general thing are very suspicious of our neighbor who has always been straightforward and honest in his dealings. When he tries to organize a corporation, or company enterprise, at home, he will soon be looked upon with suspicion, and it will soon be whispered around that he is working some scheme to feather his own nest, when the probabilities are he has not had a dishonest motive. But let some slick-tongued fellow come in and make them promises that they ought to know no honest man could fulfill and they will swallow him, goods, clothes and all. The foreign tree agent, the lightning rod dispenser, the Davis & Rankin Creamery promoters, etc. How can this thing be done? Because we are not business men and do business on a business principle. Do you suppose any other class of business men would pay out money without they knew they were getting value received?

To sum it all up, it seems to me it would be hard to get along without us. We are great producers of wealth, but we are mighty poor business men. If we would labor less, educate ourselves more in business and politics, it would be better for us and the whole country.

THE MONARCH OF AMERICA AND HIS FUTURE.

BY LUMAN BABCOCK, TOPEKA.

[Read before the Lagrange County Farmers' Institute.]

"Truth forever on the scaffold,
Wrong forever on the throne.
Yet that scaffold sways the future;
And behind the dim unknown
Standeth God within the shadow,
Keeping watch above His own."—*Lowell.*

Moving in the declining light of the old century, the world has awakened to a realization of new conditions and possibilities of the future. Humanity girds herself to encounter new evils and to right old wrongs. There's a shifting of positions and responsibilities. Leading strings pass into other hands, and already new resolutions and resolves are half spoken. But ere the future becomes the present, dare we draw aside the curtain and steal a glance at its steadily disclosing mysteries.

Through the mists which yet enshroud the coming light, the prophet and philosopher sees at last the possible verification of old theories. At the head of that grand assemblage which is to constitute American civilization of the next century, there sits the uncrowned monarch of a free people—the American farmer. Into the hand of him who, through years of patient toil and industry, has patiently and uncomplainingly endured social and political ostracism, is to be given the future destiny of the greatest nation on earth. And although by the principles of government he is denied the kingly accoutrements of false power, he goes forth crowned with honest intelligence and bearing the scepter of bestowed influence to assert his long neglected rights and assume command of that natural aristocracy whose standard of excellence is true worth and intelligence.

But here the curtain falls, obscurity reigns; the vista of the future is yet around the next corner. The realization of this enviable condition depends upon the farmer himself. Idleness and neglect place it beyond his reach. But to the energetic and persistent husbandman the encouragement of this brief survey gives an acceleration to his progress, awakens all his dormant energies and inspires him to prepare himself to successfully meet the conditions and responsibilities which the future has revealed to him through the medium of present circumstances. And hence he commences a campaign of preparation, cultivates his intellect and tills the soil, adds to his wealth of mind as well as his bank account. He no longer poses as a figurehead; he has become an element in a higher and broader civilization. The farmer of the future is not the hayseed of the past. In days gone by he was the "country lout" and "lumkin;" in days to come he will be God's nobleman and proud nature's child. In the past he anchored himself to the tailboard of society's chariot. In the future he sits within and dictates its course. The farmer of to-day who yesterday saw his son go forth into the world clad in homely homespun, the laughing stock of gilded egotism, will see him to-morrow stand shoulder to shoulder with the banker's son, looking level into the eyes of his arrogant and assiduous competitor. To-day the fruits of the farmer's industry is recognized, to-morrow the labor will be fittingly rewarded.

His money has builded the mammoth structures of our great cities, has founded the countless industries and opened the numberless factories from one ocean to the other. His persistent thrift has made possible the building of every mile of railroad on this vast continent. The farmer's dollar has begotten every other dollar that exists. His wealth is the only true wealth of the world. His frown unsettles business. His smile brings returning confidence. True, he is still denied the credit of such enterprise; but tear aside the mask with which the selfish vanity of opulence has so long deceived this credulous and deluded world and then it is that this absolute power appears as the creature of the farmer's will and energy. In very truth in the hollow of his callous and toil-worn hand he holds the prosperity and future destiny of his country.

A grateful nation has at last recognized the ability of a vocation which by its own untiring effort lifted itself from out obscurity, tore down all barriers and gave to the nation and to the world the noblest of its noblemen—its Lincolns and its Garfields.

The farmer has at last completed his term of apprenticeship; hereafter he will exact homage from that ostentatious minority, which, though clad in purple and fine linen, toil not nor spin. His rude but perfect philosophy has permeated ancient prejudice and is steadily rending it asunder. His voice is already heard in the council of his nation, his hand seen in the enactment of its laws. This noble class which contributes three-fourths of all the products that make up the nation's exports, which pays the appropriations of our billion dollar congresses, demands a recognition compatible with its ability and commendable service. They demand an acquaintance with other personages than the assessor and tax collector. The man who feeds the world must not starve; he whose labor and sweat has clothed the men, women and children of the world must wear clothes as good as the best. That day has past and gone when a half car load of free garden seeds will satisfy that million of toiling, sunburned knights who by their means have supported this government in times of peace and with their lives defended it in times of war. That mighty phalanx of heroes—behind whose ranks skulks the banker and broker at the first intimation of war—deserves and demands more fitting recognition than the simple mention in the governmental census report but once in a decade.

Let the son of toil take courage, consider past hardships and difficulties as simple stepping-stones to a higher plane. The future has shown him its possibilities, the past and present have marked the way. Let him never falter, but push onward and upward until standing on that humble throne of honest intelligence—the pride of republics, the selfsame hand that guides the plowshare shall guide the ship of state.

PRACTICE WHAT YOU PREACH, OR PRACTICAL VERSUS THEORETICAL FARMING.

BY D. F. MAISH, FRANKFORT.

[Read before the Clinton County Farmers' Institute.]

Preaching is an old occupation. Every age and condition of man has produced its preachers and theorists. Noah preached of man's wickedness and the coming flood. Paul preached of the risen Christ and the final judgment. Luther and Wesley preached free salvation and religious independence. Huxley and Darwin preached of the origin of man. Patrick

Henry, John Adams and Thomas Jefferson preached of American independence and free institutions. Garrison, Phillips and Lincoln declared human liberty and emancipation. Calhoun, Douglass and Davis advocated abridged human rights and the survival of the fittest. Coxey and his industrial army preached the rights of labor to life, liberty and the pursuit of happiness; and Powderly and Debs advocate the right of labor to protest against the encroachments of combined wealth.

It would seem from the wording of the text that somewhere, perhaps at frequent intervals, men have failed to put into practice the admonitions given to others, when some one sprung upon the community, "Practice what you preach." It may have sprung from an honest heart, and it may have issued from some individual wishing to hide his own inconsistencies and threw it out in self-defense.

The practicability of practicing what you preach depends upon the soundness of the preaching. We find upon investigation that it is sometimes attended with direful results and destructive of human liberty.

Dr. Franklin, of England, the great Arctic explorer and navigator, practiced what he preached, but in his efforts to discover a northwest passage, sacrificed his whole life and his entire crew, with the utter loss of his famous vessels, Erebus and Terror.

Capt. Delong, of our own country, with his magnificent outfit, practiced what he preached only to see his precious Jeanette crushed in the ice and sunk in a frozen sea, and later to see his companions die a torturous death and to surrender his own life on the banks of the lonely Lena river. The Mormons practiced what they preached, but got into serious difficulty with their pernicious practice of polygamy and one man rule. Jeff Davis and the slaveholders of the South practiced what they preached till it ended in a tremendous row and the horrors of civil war. George III practiced what he preached—or tried to—until the American colonies revolted and gained their independence. The Chicago anarchists practiced what they preached, but paid the penalty with the forfeit of their lives upon the gallows. Pirate Gibbs practiced what he preached, but the story of his practice makes one's blood run cold. The murderous inquisition practiced what it preached, but Christianity says it was a shameless slaughter of human life. Spain is practicing what it preaches, but American patriots declare it human butchery and a fruitless attempt to smother liberty. There are some notable examples and exceptions to this rule of human conduct. Were we to attempt to recite the numerous good results of practicing what we preach, time and space would fail us. All of the great achievements of the age have been wrought in accordance with this principle. Science, art, music, invention, learning and discovery are all the results of patient toil and practice.

Failure to practice what you preach, whether right or wrong, leaves us open to censure on the ground of inconsistency. Without practice, all preaching is vain. The world moves forward by practical operations.

The steam engine, the locomotive; the mighty river, the revolving earth are all living examples of tremendous force, energy and power. Who can foretell the direful results should mother earth fail to practice her daily revolutions—especially so if we should be left on the shady side. The rush to Klondike would be no comparison to the exodus for the sunny side. A horse would not be a horse if he failed to act. "A live dog is better than a dead lion."

This brings us to the second part of our subject, "Practical versus Theoretical Farming." We would not have you confuse the terms theoretical with scientific farming, as we believe scientific farming to be eminently practical. The time is coming when farmers will have to use more science in their operations than they do now. It ought to be the ambition of every young American farmer to know more about his business from a scientific standpoint than anyone else. Practical farming may be said to consist in the successful carrying out of all the operations of farming, even to the minutest details, without any claims as to this or that theory. The fact that a man succeeds, if he does it honestly, makes him a practical man—he may have a theory or he may not—but he must of necessity have a plan. The practical farmer is a toiling, thinking farmer.

Theoretical farming is largely an effusion of the brain. It is generally carried on a good ways from the farm and without much muscular effort. Men who dislike to follow the plow often carry on theoretical farming for amusement, and for profit. The Chicago Board of Trade, for instance, is a great farming institution. It is noted for the methods by which it farms the farmer. Its members are notorious for the amount of wheat they produce—or fail to produce. Theoretical farmers! Farmers "in your mind." There is farmer Joe Leiter and farmer Phil Armour; everybody knows them. Practical farming creates wheat, produces real wealth and is a positive blessing to mankind. Theoretical farming, as practiced on the Board of Trade, creates wheat "corners," produces fictitious prices and is a bold scheme for plundering the farmer and consumer. The Chicago Board of Trade is not the only class of theoretical farmers. Almost every small town has its quota of citizens who can always tell how easy it is to succeed on the farm and of what they would do if they were on a farm, etc. You have all heard the story, but it takes economy and practice to do it, and in these days of improved machinery it requires capital as well. Without practical farming the business interests of the country would come to a standstill. The farming end is the business end in this country.

Here is a young married man who wishes to start up in farming. At a reasonable estimate it will require an expenditure of from $500 to $1,000, taking no account of cost of land, as follows:

Household goods	$150
Teams, wagon and harness	275
Farming utensils, plows, harrows, harvesters, cultivators, etc.	225
Two cows	60
Four hogs	35
Three dozen poultry	10
Buggy and spring wagon	120
Total	$875

The purchase of these outfits and the necessary running expenses of a well regulated, practical farm is what gives impetus to trade and manufacture. This is practical farming.

To set up in theoretical farming it will cost you your board and the wear and tear on your brain. It also takes nerve and cheek to enable you to tell farmers how easy it is to succeed and that if they would work harder and eat less, and think less about the government they would succeed better.

Now in conclusion, let us notice a few things designed to be brought out in this discussion. First.—Be sure your preaching and theory of farming is correct. Keep abreast with the times, by attending Farmers' Institutes, Granges, farmers' clubs, etc., and by taking and reading the best agricultural papers. Don't get scared at new methods.

Second.—If you know a good thing that would be a benefit to the community at large, be broad enough to give your fellow farmers the benefit of your knowledge, for you should remember that your good methods did not all originate with yourself, but were borrowed from some one else. Some men are like a sponge; they are willing to "soak in" all they can from others, but will give nothing up unless it is squeezed out of them.

Third.—If you hear and know of a good thing, practice it. A great many farmers know better than they do. They follow certain ways of doing things because they have been used to doing it that way. They don't think about whether it might be done in a better way or not. Advancement in any department of life's work depends upon putting into practice the best we know. Some would practice what they preach if they could. They know of better ways to do things, but haven't the means to carry them out. The safe rule is to practice the best methods known, so far as your means and circumstances will permit. Dignify your calling by giving it your best thought and energy; strive to make your home attractive; contend for your rights in government, and the world will pronounce you a practical man.

THE FARMER IN POLITICS.

BY WILLIAM KREUSCH.

[Read before the Fountain County Farmers' Institute.]

Mr. Chairman, Ladies and Gentlemen: I have chosen for your consideration to-day a subject that is not agricultural nor horticultural, but is a subject which concerns us all. It is a social subject, "The Farmer in Politics from a Non-Partisan Standpoint."

When I say the farmer in politics I do not mean those alone who till the soil directly. I include in this all who are directly dependent and co-operate with the tillers of the soil, the merchant, the mechanic and the common laborer. Do not for a moment believe that it is my intention to try and change the political principle of any of my fellow citizens; far from it. The political principle of any American citizen, no matter how humble, is a sacred right, and cursed be he who attempts to prevent him in the exercise of that principle. Although we may differ in that principle, yet the constitution of our great land and its laws guarantee to every citizen the right to carry out and express his political principle, as long as it does not come in contact with the laws of the land and become treasonable.

A man has the right to be a Republican, a Democrat or a Populist, but above all he should be a good citizen. Politically, I am a Democrat and I am proud to acknowledge it, but I am still more proud to be an American citizen. So you see my political principle is secondary to my good citizenship. Do not charge me with flattery when I say that farmers, as a class, are best citizens. They are the pillars upon which rests our social and commercial welfare. Without the American farmer and his products this great country of ours, and some of the old world, could scarcely exist. Therefore, our farmers being such great factors in our social and commercial welfare, why should they not be also great factors in our political welfare. But are they? I ask. To some extent they are. They talk politics, of course they do; show me an American that does not talk politics. Even our women, God bless them, talk politics, and all have a preference. But we are doing our duty toward ourselves, our families and our homes when we exercise our political rights. There is a union between the farmer, the merchant, the mechanic and the common laborer, a social union that should not be broken by party ties nor even religious differences. In order, then, to perpetuate and strengthen this union we should tear asunder all political and religious differences, and as good American citizens have but one object in view, and that is the welfare of all. But do we do it? I ask. I think you will agree with me when I say we do not. I am speaking of our local political affairs exclusively. Party ties, party prejudice prevent us. When the political excitement is at fever heat we forget our home affairs, we can see nothing but the political welfare of our political party. But when the excitement is over and our turbulent minds once more have assumed their natural tranquility, then perhaps we see where we have made the mistake. We may have chosen for the management of our home affairs some men for our servants who we must acknowledge were not worthy of our suffrages. We voted for them just because they were on our party's ticket. Then we promise ourselves that we would never vote that way again. We resemble in this somewhat a periodical drinker. You will pardon me for the comparison. When a man gets on what he calls a spree his mind gets bewildered; he sees nothing but a good time ahead, nothing but fun. He forgets his family, if he should unfortunately have one, he forgets all about his home affairs. He imagines that he is all right and he knows it better than anyone else can tell him. But when the reaction sets in, that is, when his hard earned money has disappeared, the last dime is gone never more to return, he begins to realize his sad mistake. He finds that the good time he anticipated was short and his feelings I can only imagine, for I never experienced such myself. They must be terrible. Then when these clouds have passed from his mind he generally makes a solemn promise that he would never again allow himself to succumb to such beastly temptation. Does he keep his promise? Some do, but many again fall. So it is with us in the exercise of our political rights. In the excitement that precedes our periodical elections we forget our home affairs, we are tempted again, not by party ties alone, but also by those would-be party leaders who arouse our party prejudices and cause us to fall again. Some even, where the appeal to party ties fail, stoop so low as to appeal to the religious prejudices of the voter against the candidate who otherwise is a pure and upright citizen. Shame, I say, on the American citizen who allows his religious prejudice to even tempt him to cast his ballot against an upright fellow citizen just because his religious views differ from those of his fellow man. Such a voter is unworthy to be called an American citizen, and is fit only to live in a tyrant's land.

Now, then, let us consider why national politics should be separated from our local political affairs. The excitement preceding a national contest bewilders the mind of the ignorant and those who are not well enough informed on the principles of national affairs, and rather than be in danger of casting an illegal ballot they vote the ballot as it comes from the press, and often vote for men on the local ticket whom they know are unfit to put in positions of honor and trust. In national politics, a citizen, be he a farmer or politician, should have a political principle, and carry it out, but first of all as a good citizen he should convince himself that he is right, and when he believes conscientiously that he is right, he should cast his ballot according to the dictates of his conscience and not allow himself to be led by unscrupulous politicians, or be driven by the crack of the party whip.

In our home or local political affairs it should be different. Party principle should be laid aside; party ties should be torn asunder and all should work for the principle of how we could benefit the conditions of ourselves, our neighbors, and those who co-operate with us. In our Farmers' Institutes we try to learn, one from another, the best mode of raising the different farm products, wheat, corn, cattle and hogs, and how to make them the most profitable. But would it not be as well to not neglect to learn how we might better the conditions of the farmers and those depending on them, by discussing in a non-partisan way our public home affairs? You have certainly learned by this time that you have been and still are paying the expenses of running these public affairs, the same as you have to bear the expenses of your private affairs of the farm, the stores and the workshops. Would the farmer hire, for instance, a hand, or the business man a clerk, whom he knew was a drunkard or a dishonest man just because he belongs to the same political party that he does? I think not. Neither should he by his vote at our local election say that such a man should be at the head of any of our public affairs.

The Scriptures tell us that our Savior said that no drunkard or dishonest man shall enter the kingdom of heaven, and we should demand by our votes, regardless of political party ties, that no such a man should enter in the discharge of the duties of our public affairs.

Experience has taught us that party affiliation is generally set aside by many of those whom we put at the head of our local public affairs, when the almighty dollar is to be made from the public crib. The politics are not thought of, money has to be made out of the office, because it cost money to get it. It matters not whether it is a Democrat or Republican who holds the office, it cost him money to get it. I venture to say, that if we should even put third party men, Populists, at the head of local political affairs, it might not be better, for a Populist could not be elected with less expenses to himself than other politicians, and then we might select some of their black sheep who would not show their color until they were turned in a good pasture. Now, do not understand me to mean, nor even intimate, the servants of the people of Fountain County. Not by any means. I am speaking of the conditions in a general way. We have now, and have had previously, some of as good and better public servants in our county than the average county officers in the State, and the people are to be congratulated upon that fact. But yet there is a dissatisfaction among our people on account of our high local taxes. The farmers generally, on account of the low prices of their products, are most dissatisfied. They cannot pay their taxes with butter, eggs and the surplus vegetables they raise, as they pay for their groceries and other necessaries for the family. Taxes must be paid in cash when due or else the farm and home is at stake.

Now, then, the question presents itself, Is there a remedy? There certainly must be. I cannot believe that the evil is incurable. The people are the doctors in this case. They must act, and first of all must lay aside all prejudice and examine the disease, find a remedy and apply it without prejudice or fear. But how can a remedy be found? Let us see. This is an agricultural State, made up mostly of farmers and their adherents. They pay most of the expenses of the country that are caused by this evil. Let them organize and find the remedy. Organize not as a distinct political party, but organize township Institutes in every township in our great State. Invite the merchant, the mechanic and the laborer to unite and participate; discuss the question, not from any political standpoint, but from the standpoint of true American citizens and neighbors, for the common good of all. Then when we do this I assure you we will find a remedy that not only will cure the evil, but will destroy the bacteria and all the causes that brought about this evil.

OUR COUNTRY'S PROGRESS.

BY NOBLE C. TRUEBLOOD, SALEM.

[Read before the Washington County Farmers' Institute.]

All day long the elements warred, as though wanting to drive away all cheer from the face of nature. The sun feared to show his countenance. Early morning was ushered in by a gale of snow, sleet and wind that did not abate in fury, and as evening drew near, the storm increased in intensity; there seemed nothing to make glad the day. The old sea seemed to catch the spirit of the gale and was leaping high towards the clouds, then plunging back into the deep; roll after roll of huge waves ran mountain high, then sprang forth like a mighty monster after a prey. Nightfall came, and we might see through the dim mist the faint light of a ship, driven by the storm and the sea. Its rudder was wrenched away, yet, as if by divine Providence, it drove into a safe haven, there to anchor free from danger. It was the Pilgrim Fathers, landed in a new world on the Rock of Plymouth, Saturday, Dec. 9, 1620. Filled with joy at the idea of leaving religious persecution, they sailed from England in the beautiful month of May, and after many difficulties and dangers of a six months' sea voyage, they stepped ashore on a savage wilderness, covered with snow. No cheer in all the land could they see, yet did they sing—

God bless the happy Spring-time,
  That bore the Mayflower up;
To shed amid New England bowers
  The treasure of its cup.

It is a favorite idea among all writers, to base the beginning of our history, back to the landing of our Pilgrim Fathers. So to-day, in marking the start of our progress in national history, I shall borrow a thought from Plymouth Rock.

After winter had melted into spring, and many of their little band had passed to the grave, those left turned to the tilling of the soil; not depending on fishing, hunting or trading did they look for a support, but to labor in the fields did they see rested their independence within themselves; and that one principle has been instilled in the heart and mind of every true-born American all down these years. That we alone are independent, not by our gold and silver mines, manufactories or railroads—they are great factors in the fabric of free government—but the foundation and bulwark of America's independence is largely sustained by Columbia's sons who follow the calling. Gray eulogizes thus—

> Oft did the harvest to their sickle yield,
>   Their furrow oft the stubborn glebe has broke;
> How jocund did they drive their teams afield,
>   How bowed the woods beneath their sturdy stroke.

Amid disappointments and discouragement the little colony grew, increased and labored on in hope, until within thirty years they, with the Jamestown colony, producing more than they could consume, began to load vessels, for European markets, laden with corn, wheat and tobacco.

England became jealous, and passed the "Navigation Act," prohibiting the transportation of our products except in English vessels.

Not satisfied with the Navigation Act—seeing it did not dismay us—England passed a law that we should sell our products only in England.

Then the colonists thought if they could not trade with any nation save England and for English prices, for what they had to sell and buy, they would go to making their own goods and machinery. From this we gather that the farmer created the manufactories and that they are dependent on the farm. We find all along our history this one great fact. The farmer goes before to clear the way, soon to be followed by the manufacturer as a pure necessity.

Then, said England, you must pay us a duty if you take your products from one colony to another. If Plymouth wants to exchange corn and wheat into Jamestown for tobacco, you must pay England for the privilege. But the colonists pressed forward, the farm sustaining them, the manufactory an absolute necessity. We find up to 1719 England had failed to check this brave people in their onward march and in that year passed a law prohibiting the building of manufactories, as it lessened our dependence on the mother country.

In 1732 Parliament prohibited the transportation of goods from one colony to another. We, undismayed, kept sowing and reaping, making machinery and constructing buildings, changing products and tools. We needed no help from England. We labored on. In 1750 it was declared in the House of Lords that the colonists had not even the right to manufacture a nail for a horseshoe.

Plainly were things fast approaching a crisis. England could not hinder nor check our growth; the people could not endure British tyranny much longer. What was to be done was hard to tell. A duty on tea, then the "stamp act," broke the last connecting cord. A spirit of indignation was brewing in the hearts of Americans. England was denounced in thrilling terms by our patriots. "The folly of England was the ruin of America." The colonies called together a general assembly, known as the Continental Congress, at Carpenter Hall, Philadelphia. Liberty and freedom had been mentioned as our only hope and safety. The walls of Carpenter hall were heard to ring with the shouts of our patriots: Give us liberty or give us death; independence now and freedom forever.

After long weeks in session, during which time the nation was wrapped in gloom, the people gathered each day around Carpenter hall that they might learn what was being done on the inside. Some wondered if they would do it; others thought they dare not do it, and on a warm day in midsummer, it was past two in the afternoon, the crowd gathered thick and thicker about the streets and seemed frantic with denunciations of England, for word had come to hand that an English fleet was on the ocean. The crowd swayed to and fro. It is July the fourth. Listen! High up in the tower the bell rings out the glad tidings of joy that was heard in heaven. People could stand it no longer; amid shouts and yells, hats were hurled into the air. The hearts that before were filled with gloom now became filled to overflowing with joy and gratitude. Bonfires were built on the hilltops, cannon began booming on the ocean, and the surrounding forests kept flinging back the echo of the bells as they rang on that glorious occasion. I partake of their spirit and want to shout with them. Long may the bells ring out for liberty. In 1782, under Washington, we secured our independence, to the immense and undying advantage of freedom throughout the world.

A nation leaped into the light, plucked its emblem from the starry heavens, that shall never fall as long as nations live and world's stand and constellations sweep through the sky. Run up a banner of red, white and blue, peace, purity and patriotism.

> Long may the star-spangled banner still wave
> O'er the land of the free and the home of the brave.

This marks a period not alone of our nation, but also of the world; free government throughout the world. How great was our progress? Within a hundred and fifty years we had done more than all mankind had accomplished in a thousand years. It seemed to the old world as a dream more than a fact, that away across the ocean in the new world a great nation had been born, on freedom and equality to all, where the people make the laws and every man is equal to a monarch.

Immediately congress drops her shackles, leaps forth and has never checked. Liberty gave stimulus to all business. As the result of a free mind, at once we hear the sharp, shrill sound of the steamboat whistle as she plies her way on the bosom of the Hudson, carrying the products of the happy and contented husbandman and the wares of the manufacturer. Also the cotton gin came to light, sending more laborers into the forests to fell the trees, make ready the land, and at once the rich loam of the south puts on a gay whitish garment as she blossoms and ripens with the beautiful fabric. Again the manufacturer is heard. He has come to the help of the planter to prepare, make ready and weave into cloth. On every hand the hum of active life is heard from morning till night. The waterwheel turns over and over, while the farmer's grain is poured into the hopper, making flour for distant ports.

Emigration swept in from oppressed lands by the liberty and progress of the new nation until the east coast became full, like a goblet gradually fills till its contents begin pouring over its rim. The population increased; the tide poured in; they pressed up the mountain side, rolled on the cloud-bathed peaks of the Alleghanies, swept down the western slope, and a happy people, filled with gratitude, pressed into the beautiful basin beyond, picked up the axe and

Erected a cabin in the woods
Wherein he stored his household goods.

Took hold of the plow, dropped in the seed and again new fields brought forth more than abundance. Yet the tide rolled on; others came faster and pressed farther on, for

'Tis told in riding somewhere West
A stranger found a Hoosier's nest;
Its situation, low but airy,
Was on the border of a prairie.

Blest Indiana; in thy soil
Are found the sure rewards of toil;
Where honest poverty and worth
May make a paradise on earth.

Soon the steamboat plowed its way up the Mississippi and back again into the mighty highway of the sea, loaded with corn, wheat and bacon, the products of the industrious farmer. But lo! listen! what rumbling is that we hear in the forests, what bell, what keen whistle? Leaping, snorting and puffing, the huge steel horse rolls onto the prairie. There is grain of all kinds and stock in abundance over the Alleghanies in the rich valley beyond; we cannot wait for the slow steamboat or the weary wagon train; but a quicker means must be found to bring these riches to the Atlantic coast. All hail to America! Stimulated by liberty and the husbandman, she added the great locomotive to the steamboat, and freedom and liberty gave both to the world. The shrill voice of the iron horse was heard across the ocean, and a concourse of oppressed people wandered o'er the deep to a free land.

We listen in the morning to hear with us still the hammer of the manufacturer; he seems friendly to the husbandman, and we realize each copartner in active progress. The merchant also has dropped over the Alleghanies and has begun to hand his goods over the counter to his industrious neighbors.

Cities, as if by magic, spring up, and their offspring without waiting for maturity push on; over streams they rush, struggling towards the beautiful West. The plow turns the turf sod; progress walks in the green furrow. Till the stranger, traveling somewhere west, changes his psalm. We hear him break forth in these words:

> Oh, Kansas land; dear Kansas land,
> On thy virgin soil 'tis here I stand;
> I look away across the plains
> And wonder why it never rains.

More joy in activity, the busy Anglo-Saxon drives all before him. Nothing dismayed, he travels on towards the place where the sun sinks to rest. He has reached the Rockies. Up their steep side he clambers. Placing his feet in his snowshoes, he trudges over their icy peaks, and with the eternal snows still clinging to his shoes he slides into the coast valley beyond. In the morning he goes forth to sow; harvest time he reaps. His friend the manufacturer has kept his trail, comes to his aid and erects a mill. The waterwheel is ready to turn; the mill race most completed. We hear the pick as it is driven into the sand, and with its exit we look into the sparkling water as it drips from the point. Behold! we shout, Gold! Gold! The place which De Soto sought for in vain is at last found. The wonderful Eldorado, indeed, is in the land of the free. The breezes waft the joyful news to every land and fanned the fragrant roses of distant gardens, where sleep oppressed mankind, as he dreamed a dream that life in the new world was greater than a fairy tale. From all climes they come over rivers, seas and mountains to drink at the magical fountain. The husbandman plies his useful art, the manufacturer pounds away on his steel, the steamboat plies on the beautiful stream, the iron horse, roaring, puffing and jerking, leaves his trail of black smoke through the forests and over the prairies as he whirls from Plymouth Rock to Golden Gate.

The faithful harvester sows and reaps, proud of what he has done, and of what he can still do. The Western coast also becomes joyful in active life. It bends to the will of the cultivator and soon its breezes are loaded with the fragrance of tropical fruits as they ripen for the world. Great is the attraction; many continue to press towards Golden Gate, hoping to bathe in the zephyrs of the orange blossoms and become young again.

A dream, yet not a dream. The progress that threw off its shackles in England's face in 1776, in 1850 had in just seventy-five years spanned the new world, and sent back the echo from the Pacific to the Atlantic and back again, that progress means "liberty and union, one and inseparable, now and forever."

Great statesmen from the farm and town have thrilled vast assemblages of people with their matchless oratory. The farmer of Mt. Vernon became

"The first, the last, the best;
The Cincinnatus of the West."

And the Father of his Country.

The farmer of Monticello became the inspired penman of the declaration—Thomas Jefferson. The farmer of the Hermitage became the hero of New Orleans, better known as Andy Jackson, Old Hickory. The Rail-splitter became the Great Emancipator, and loved as immortal Abe Lincoln.

The farmers to-day claim a Matthews and a Mount. As a nation, ought we not to feel proud when we think what we are? We have grown in wealth till we are the wealthiest nation in the world. We have become the greatest manufacturing people in the world; we have surpassed England and almost outstripped Europe. As a nation only a little more than a century old, we stand first in invention, leading the rest of civilization. In railroads over half of all the world are situated within our fair land. We do one-third of the mining of the world. One quarter of the manufacturing of the world; one-fifth of all the farming of the world, and possess one-sixth of all the entire accumulated wealth of the world. Do we say this is progress? A word yet to be found must express it. Wonderful phenomena!

Though we have met many a dark day, nations have tried to check us in our march of progress. The curse of slavery, which had distracted us at home and sullied our name abroad, has been wiped out by true and loyal sons, that this "Nation under God of the people, by the people, for the people, might not perish off the earth." How gloriously have we triumphed over them all, and still we rush on, as a planet sweeps through the skies under the guardian eye of Providence, never losing its course. We have sailed on, stalking, it seemed at times, into the impossible, while other nations looked on in amazement.

Ye honest toilers of the field, should you be proud; hold up your heads and see

Acres on acres everywhere,
The look of smiling plenty wear.

How true are the beautiful lines of Holmes:

These are the hands whose sturdy labor brings
The peasant's food, the golden pomp of kings.

How gladly I hold to the farm when I see all its advantages and glory! May it be to all one profession to say in the spirit of satisfaction:

With what content and merriment
Their days are spent, whose minds are bent
To follow the useful plow.

All hail to the farmers as founders of America! I am glad to be found in their ranks. Surely the time for the farmers of America to rejoice is near at hand. Lift up your heads, O ye gates, and be ye lifted up ye everlasting doors—a grand truth is stalking to the front. In the future our farmers will stamp a glorious record on the pages of history; when the great searchlight shall be thrown on the sky that is adorned with honor, statesmanship and patriotism, it will display the humble farmer there—a pride to the farm, an honor to the Nation. I hope to see them stars of superior brilliancy in the constellations that adorn the sky of nations.

Then glory to the steel
  That shines in the reaper's hand,
And thanks to Him who has blest the seed,
  And crowned the harvest land.

As true Americans in every way, as brothers of the farm, arise, weed out from a true breast all envy and malice, that we may adopt the language of Abraham Lincoln—"With malice towards none, with charity for all, with firmness in the right, as God gives us to see the right; let us press on." Charity for the merchant who, from morning till night, treads the tiresome treadmill behind the counter; charity for the laborer who only asks for honest wages and respectable treatment; charity for all and brotherly fellowship with all, in all respectable businesses; our progress will be greater, we will be wiser, better and happier.

With man to man united,
And every wrong thing righted,
The whole world will be lighted,
As Eden was of old.

THE TELEPHONE AND ITS RELATIONS TO THE FARMER.

BY MISS GERTIE JOHNSON, OWENSVILLE.

[Read before the Gibson County Farmers' Institute.]

Each decade marks a new era in the world of development. The present decade is not behind its predecessors. Every invention, as a general rule, adds to the comfort or convenience of man. Many very important inventions have been made which were designed for man's advantage, which people were slow to realize. In fact, every step of progress has met with its adversaries—people ready to condemn it as being a humbug; every new theory advanced, no matter how plausible or reasonable, is at first met by objectors; and so every invention is at first criticized by a large percentage of the people, and it must work its way into public favor by slow degrees. It is a little strange that man is so slow to accept of the useful inventions of his fellow man when the utility of it is so plain that there can be no mistake. But I am digressing; I have been asked to write a paper concerning our telephone system—I say our telephone system because the country telephone system of southern Indiana is peculiarly the Owensville telephone system, from the fact that it was in Owensville that the first country telephones were used in this part of the State; and as we said in the outstart, it is a very difficult task to get people out of the old ruts and try something new, let it be ever so meritorious. So it has been with our telephone. Notwithstanding that it has been some fifteen years since the first private independent line was constructed, it has only been about two years since the people began to realize the importance of telephones in the country; but we are glad to say they have at least learned of their utility and are fast falling in with the use of them, so that now many people all over the country within a radius of ten miles of Owensville have telephones, and before another year many more will see the necessity of them and come into the organization. It would be wasting words to talk to the people of Montgomery Township about the convenience of telephones, as they nearly all know by experience better than any argument can tell them; but for some of our backward neighbors in other parts of the county, where they know almost nothing of its great benefit to the farmers, I will venture to make a few suggestions as to its uses.

First, I will take the position that there is no one thing that the farmer can invest his money in that will bring him a better return, considering the amount invested. The cost is comparatively nothing, as the real outlay of money will not exceed $20 to buy his instrument and pay for his part of the necessary material to put up a line. Where there are, say ten, instruments, the cost of maintaining the line and fee for exchange would probably be $2.50 per year; that includes battery, exchange fee and line repairs. Some years it will not cost so much, while others the repairs might be more, but I put it at $2.50 for an average. Now, as to its advantages. First, it is worth more than the cost in a social way, as to my mind the independent country telephone is the greatest promoter of sociability among different neighborhoods than any other factor that enters into the social element, and the nearer you bring people together socially the better people and society we have. Place people in a condition that they are forbidden the influences of neighbor associations and you, to a great extent, ruin their influence for good. The nearer we can bring neighbors and friends together socially the better will be our society, one of the great objects of benevolent societies is to bring people nearer together socially, not that we would have all people on the same level socially unless we could have that plane very high, but that we would cultivate a disposition or sentiment of nearness among all good people. You have noticed that in settlements where people associate together much and are not clannish, that such settlements are more social. But aside from the social features of the country telephone, there are other benefits that more than compensate for the outlay. There is nothing too good for the American farmer or citizen, as his push and enterprise entitles him to the good things of this world and he ought to take advantage of every convenience that adds to his comfort and happiness, not that he should be extravagant or reckless in spending his money, but every cent employed to add to the comfort and convenience of farmers' homes, to my mind, is money well spent, and when I hear people criticize farmers for spending their money for such things, I think that such criticism is unjust. Now, as to the other phases of advantage of the telephone. By the telephone the farmer is almost brought to the very doors of the markets of the world, and every change can be given him almost as soon as it is reported to the boards of trade or the great centers of commerce, which will enable him to know just when it will be best to market his produce. The weather reports which are sent out to all the towns of any importance can be furnished him every day, which would at many times be important to him. Of course he is not educated yet as he should and will be to the importance of these things, but it will not be long before he will be, as he is fast coming to the front, when he will not be content unless he is as thoroughly posted on every current event as his more favored neighbors in the towns and cities, and again he is saved many hardships, as in case of sickness his family physician can be consulted at any and all times without leaving his fireside; his neighbors can be called at any time, which often saves many trips in bad weather.

We realize that our system is as yet imperfect, but who would want to give it up just because there are some imperfections in it? Ask any one who has used a telephone for a year or two if he would like to give it up, and you will find that all, without an exception, will tell you that they would not be willing to give up their telephones. The farmer of Montgomery Township and, in fact, the farmer of southern Gibson and northern Posey counties, can sit at their homes and talk to more than five hundred of their kind and many business men besides. Their sons and daughters can likewise talk to their associates, and many pleasant hours are spent in this manner; and oftentimes, to profit as well as pleasure, I have known teachers to instruct their pupils concerning their lessons during the evening, thereby helping them when they were greatly in need of help; students of the same class assist each other in their work while they are at their homes in the evening.

The uses of the country telephone are so many and varied that it will be impossible to enumerate them all in one short paper where our time is limited as it is in this Institute.

In conclusion, I shall claim that to Owensville, or its citizens, belongs the credit for promoting the country telephone in southern Indiana, and I cannot close this paper without giving some advice to the people that own and control their telephones. Look well to your interests, as the time will come when you will be asked to give up the control, management and ownership of your system, for it will occur to capitalists, in time to come, that you can be induced to pay tribute to a corporation that will make very flattering propositions to induce you to give up the management to the hands of a company, and the greatest inducements will be offered to get you to give it up; but let me admonish you to not do it; you love your institution and you cannot afford to let loose of it.

Now, to our friends from a distance, who live in settlements not progressive as is ours. Let me urge you to not delay in making one more step forward and organize telephone lines, and you will never regret it. Ask your neighbors about it and learn of them whether it is money well spent. As we have before said, there is nothing too good for the American farmers and their families, and it is money well spent when you are using it for your convenience and things that will add to your happiness and comfort.

To our friends that live in settlements where the telephone has not found its way, we ask you while here to visit our exchange and you will there learn something about a country telephone exchange, for there you will find the terminus of sixteen lines, each line having from ten to eighteen 'phones on them and radiating in every direction, connecting all the towns and many of the farms within ten miles of Owensville.

"HARD TIMES."

BY OLLIE HERITAGE, ALEXANDRIA.

[Read before the Madison County Farmers' Institute.]

There has never been a time since the dawn of creation when some one was not complaining of "hard times." Few words are heard oftener. The truth is, times are always hard with some people.

Oliver Goldsmith, in his comedy, "The Good-Natured Man," introduces Croaker, and Croaker has never died. General prosperity, whomever else it helps, never reaches him.

If we notice the class of men who are habitual grumblers, who are forever complaining of "hard times," we find the fault is the result of circumstances which can be controlled. In the first place, they are but tamperers about their work, and at best it is only half done. They know a great deal superficially, nothing perfectly, and such knowledge is out of touch with our times. They have ideas, but they bring nothing to perfection, and they grumble and cry "hard times" because the world will not pay for unfinished work.

Another class are men with too much leisure. Busy men are seldom heard to complain. Men who have real work to fill all their hours keep no catalogue of their wrongs; and even a positive injury or injustice does not worry them into a constant fret and complaint about it.

Some people complain because they think it adds to their importance not to be too easily pleased. If any work is done for them they hesitate and wonder about its worth and value; all the time being conscious that the work is good work, and worth a genuine word of praise. If they go to church, the sermon is worthless, the minister's manner or voice is disagreeable or the singing offends. The weather never suits their health or plans. Every person they have any business with is trying to cheat them, and even in public affairs they are not satisfied—the country is going to ruin, the good men, the honest politicians are all dead and buried. Indeed, if all the hard things grumblers say were written down they would be ashamed to read them.

As we trace along the pages of history, we find that grumbling existed throughout all the past ages. The Children of Israel spent most of their time grumbling. They imagined "times were very hard" with them. Either food was scarce, their taskmasters were cruel and exacting, or they had to make brick without straw.

It was "chronic hard times" all through the "dark ages," which lasted for hundreds of years, and history records but few periods of prosperity even for the few. So it goes all through the ages down to the present time. Thousands are complaining and sighing for the "good old times."

If we could but compare the present condition of things with the "good old times," we would think of rejoicing instead of grumbling. We hear a great deal said of the hardships of the farmer, but he is a king compared with his father or grandfather. If he doubts it let him hunt up the old gentleman's day-book of fifty years ago and note the prices then. A bushel of wheat would buy three-fourths of a barrel of salt. Ten pounds of butter bought six and two-thirds pounds of sugar. It would now buy forty pounds. Ten dozen eggs would buy about five yards of calico. To-day with as many eggs we could buy thirty-five yards of calico. Surrounded by these conditions, life on the farm was hard indeed. Calico and Kentucky jeans had to do for Sunday garments, and an ox-cart in which to ride to church was the height of style.

Luxuries for the table were almost unknown. Johnny-cake and salt pork was a princely diet. Those were days of "hard times," when the farmer cradled his grain and raked and bound it by hand. He toiled early and late, saved and scrimped, and received less return for a week of hardest toil than the farmer of '98 receives for a single day's pleasant ride on a mowing machine or a self-binder. Such were the "good old times" that croakers sigh for.

The last half century has fully recognized the high calling of the farmer. Princes now aspire to be "model farmers;" science caters to the occupation, and mechanics is its hired servant. In the United States this is especially the case; no country, in any age, has done so much for farming. Its plows, reapers, mowers, its spades and hoes, are known all over the world for their lightness and strength; it has greatly improved the horse-rake, invented sowers, subsoil and trenching plows, cultivators and threshing machines, and, in fact, has done more for the science of farming in fifty years than has been done for some sciences in a thousand.

There are sciences that have grown aged and fallen from the world like an old garment. There are others the world remembers as a man remembers his childhood toys. But farming has only just finished its 6,000 years of childhood, only just begun to understand the mighty promise implied in the command, "Replenish the earth and subdue it."

For the past few years things have been very dull and there has been some room for grumbling. But times are showing improvement, slowly perhaps, but nevertheless steadily. Industrial, commercial and financial affairs are getting in better shape. Of course, it is not expected that Croaker will abandon his mission, but surely it is only necessary to look around on the gigantic sorrows of life—war, sin, suffering, poverty and ignorance—and then hold our peace from any words but those of thanks and praise.

If we would all make an effort to try cheerfulness instead of complaint, we would not only be a blessing to ourselves, but to all those who come near us. Cheerfulness is a moral tonic; it is the life of lives.

And now we will suppose that we do not always get what we work for, and believe we really merit—what reason have we for complaining? Is this world all? Are there no rewards but temporal ones? Is it well to grumble and complain at the trials of life? No; there is a better way—let us serve and sow, and therewith be content, for even as we toil, the Lord of Harvest will come.

ROADS.

BY J. F. LINGEMAN, BROWNSBURG.

[Read before the Hendricks County Farmers' Institute.]

Roads are the arteries of a country. Through them courses the life of commerce, of social intercourse, of education, of religion—in fact, everything which nourishes, builds up and develops it. The commerce of a nation first moves by way of its roads. Social intercourse among its inhabitants can only be secured by the highways of the land. Education advances through the same channels. All that is best in life comes through the facility of communication with our neighbors, the villages, the schools and the churches through the public highways. We are proud of our country and are justified in calling it the greatest nation of earth, but in one thing, at least, we are lacking—good roads.

There is a universal recognition of the distressingly improvident and wasteful condition of the common roads of this country. No detailed description of the deplorable existing condition is necessary. Object lessons of bad roads and bad road-making exist to-day all over our land. Every farmer becomes familiar with them as he journeys to his neighbors, to the markets, to the village or church. His children learn the lessons of bad road-making as they trudge to and from their schools. There has been so much knowledge gained by all that there seems to be a universal uprising in behalf of better roads. The press of the country is earnest in its advocacy of good roads and is doing a great work toward bringing about a revolution, which is sure to come in our system of roadwork.

Boards of trade and agriculture, commercial bodies, agricultural colleges and universities, farmers' clubs, bankers' associations, wheelmen's leagues, United States Senators and Representatives, Governors of States, military authorities, and, in truth, all the elements of force and power in any great movement, seem to be allied in the campaign for better roads.

The best roads in the world to-day are those of France, Germany and England. To national supervision is largely due their excellency. Our roads are far below the average and always have been. Local supervision with no definite system of building or maintaining them has prevailed all over our land. There are other causes which account for the disparity between our roads and those of the countries named above. France, Germany and England have had the advantages of cheap pauper labor. Centuries of civilization have given those countries time to accomplish very much that there has not yet been time for here. Their development of a practical highway system was in advance of the invention of railroads and steam navigation, when the mails and merchandise traffic were transported over the common roads; so that for centuries the necessities of good public highways prompted and encouraged their building. Moreover, those European countries have a dense population compared with ours, and their respective areas are much smaller. Our country, on the other hand, is one of vast domain. Our population is scattered over an immense extent of territory. Railroads and steam navigation became the prime factors in the transportation of persons, mails and all commodities in the early development of our country, thereby checking for a time the progress of road-making, then only just in its infancy and from which it is now again emerging.

We need not be discouraged. Good roads come slowly but surely. Every man, woman and child in our land are in favor of them. We have all the needed material for their construction. We have abundant capital for the enterprise, and good roads will be made. An eminent writer says: "The road is the physical sign or symbol by which you will best understand any age or people. If they have no roads they are savages, for the road is the creation of man and the type of civilized society." This is putting it in pretty strong language, but we should have credit with some, if not all, the excuses mentioned before in this paper for the bad condition of our roads.

It is not possible under our present road laws and the system generally adopted in applying road taxes to make any rapid progress in the construction of good, permanent highways. The abuse that has been heaped upon the meek and lowly supervisors is, in most instances, unjust. They are supposed to apply the road taxes so that the roads of their respective districts will be passable during the twelve months of the year. Many of them make an honest effort, but with what success? You who will travel the country over during the months of February, March and April, canvassing for a county office will be in a position to answer. Your answer can be anticipated. It will be—they have failed. Why this failure? There are many reasons. How many of our road officers have made a study of scientific road-building? How many are skilled engineers? What opportunities have they had to fit themselves for practical, economical, permanent road-building? Are any of them sought after to supervise the construction of streets in large cities? Are any of them wrestling with propositions from the great railroad corporations, begging them to supervise the construction and maintenance of some great trunk line? These questions are not asked for the purpose of ridicule, but for the purpose of reflection. You say they are overdrawn, that the cost of building streets and railroads is out of all comparison with the amount applied by supervisors. Is it? What has Hendricks County expended during the past thirty years through these same supervisors and road officers? Have we expended enough to justify the economical, practical, skilled application of it? Your answer would be most certainly yes. If, under our present law and system of road-working, it be not practical to have a skilled application of our taxes, let us evolve a law and system which will make it practical. Suppose the building of the great trunk lines of railroads had been undertaken on the plan we are pursuing in the construction of our highways, would we have the 200,000 miles of completed roads which we have to-day? The plan by which they are built is to secure the capital necessary through loans on bonds, employ the most skilled engineers to construct them, and then pay for them out of their earnings. Cities are engaged in a general system of paving streets. This is done by issuing long-time improvement bonds. By this means they have the use of paved streets years in advance of our road-making system, and the burden of taxes falls no heavier on the property owners.

The annual road taxes of this county are sufficient to build roads of standard excellence, but applying the taxes annually as collected we will wait many years for this consummation. The fault lies in having such limited amounts to expend at any one time. County Commissioners and all road officers have experienced this. They realize each year that it would be economy to extend the improvements of many roads, but, having exhausted the available funds, improvements are left in such an uncompleted stage that, in many instances, the labor is lost. Then, too, the cost of maintaining bad roads, even in a passable condition, is enormous, compared with the cost of keeping good roads in repair. This is an object lesson you have all seen. A heavily loaded wagon drawn only once over three or four miles of road in the spring, when the frost is going out, does more damage to that road than could be repaired with one hundred dollars.

Broken, disjointed, spasmodic legislation has filled our statutes with a mass of impracticable road laws.

It would be well for our State Legislature to enact a law providing for a State highway commission, whose duties would be to make inquiries in regard to the result of the present system of road management throughout the State; to make investigations in regard to the best method of road-making; to consider the question of direct State aid to road-building; to revise and consolidate the statutes relating to the construction and improvement of roads, and to formulate and recommend new road laws, based upon the knowledge gained by their investigations.

This paper wishes emphatically to advocate State aid in road-building. The justice and policy of such aid cannot well be controverted. "It is the only method through which cities and corporations, which pay the bulk of our State taxes, can give the help which most of them are willing and anxious to give towards the building of country roads." The success of such a plan need not be questioned, for already, in New Jersey, where State aid is given, it has met the wants of the people in a marked degree, and other neighboring States, availing themselves of the experience of New Jersey, are fast shaping their road laws on a similar plan. The essential features of a successful road law are: (1) State aid in their construction; (2) authority to borrow money on long-time bonds at a low rate of interest and applying the money as rapidly as it can be done in the construction of highways; (3) requiring the employment of only skilled and perfectly competent engineers to supervise road construction; (4) abolishing the system of working out road taxes and requiring all to be paid in money, using the taxes to pay the interest and create a sinking fund to pay the principal when due.

While awaiting the millennium of good laws and good roads, let us not be idle, but study the best methods of applying our taxes, under existing laws, and follow them. There is nothing connected with the making of roads of more importance than drainage. Our farmers and road-makers have had a great deal of experience in the drainage of fields and roadways, but yet we do not half appreciate the wonderful results which can be secured by this process. The first and absolutely necessary requirement of a good road is efficient drainage. It is the first law of road-making. The gravel, broken stone or whatever may be used for the metaled surface of a road must be supported by the road-bed. Most earths form a good foundation so long as they are kept dry. When softened by moisture they will not support the metaled surface, but allow it to settle, break into ruts and mix with the soil. Most of our county roads have clay as the road-bed. When dry and compacted it will support any weight. It does not absorb water readily, but requires that water be held for some time in contact with it in order that it may become saturated; although when saturated it easily yields to any pressure, and in such a condition is wholly unfitted for a road-bed.

Object lessons of poor road drainage have been seen by every farmer in Hendricks County. Surface drainage, when the water is carried from opposite directions along one or both sides of the road to the lowest level and there permitted to remain until absorbed by the earth, which forms the road-bed, is familiar to all of you.

How many of you have deposited gravel upon road-beds which were naturally damp and wet without any subdrain being constructed? If we could resurrect all the gravel, which has been at great cost dumped upon our roads, and on account of no drainage has gone down toward China, we would have an abundance of material to convert these same roads into excellent highways, if proper skill should be employed in constructing them. Surface drainage is accomplished by making the section of a road higher in the middle than at the sides, with ditches or gutters at the edges of the road, which conduct the water to some side channel through which it may be discharged. Our roads, being covered with gravel, which is permeable to water, should have considerable slope from center to sides in order to secure good surface drainage. During the rainy season the imperfect surface drainage of our roads is visible to every one who travels them. Having no heavy iron rollers to compact the graveled surfaces, we depend on traffic to pack them. Here is the result—three well-defined trenches are made in the surface, one on each side, made by the wheels of vehicles and the two horses drawing them, and one in the center made by the single horse drawing vehicles; naturally these furrows during rainy seasons are filled with water, which, having no other way of escape, penetrates, not only through the surface gravel, but down into the road-bed beneath, making both soft and yielding and subject to great damage by traffic while in such condition. Moreover, our roads in this climate are subjected to great damage by frost. Frost does no injury to a dry roadway, but we are all familiar with the havoc it brings to our highways. In the spring, when, as we say, the frost is going out, hardly any of our roads are fit for travel, and, in fact, we restrict by law the weight of loads drawn over them. Let us cure these defects in our roads by proper surface and subdrainage. Nothing is of more importance in road construction. Nothing will pay better for present use than good tile drains, at an average depth of three feet, on each side of all wet road-beds, and they will count for all they cost in the future road-building. I would recommend that these drains be made parallel with the road and at a distance of twenty feet apart, discharging them at every opportunity afforded by a cross-channel. Before any gravel is applied to a road, the bed should be first prepared by elevating it at least a foot above the common level of the land. This can be well done by the use of road graders. Great care should be exercised in preparing the surface. It should be slightly oval, smooth, of uniform width and made firm and hard by the use of a heavy iron roller. Then you will have a grade ready for the application of gravel, and the use of a roller again is just as imperative. Certainly a great saving in the cost of maintaining our roads could be made by the use of a heavy roller, in first compacting the earth grade and afterwards the surface gravel. After making repairs on the roads of a district where necessity requires them to be made, select a piece of road which accommodates most of the taxpayers of a district, and apply all the balance of roadwork and taxes to the construction of so much of that road as may be completed in a substantial manner. Continue this system year after year and much will be gained over the plan of allowing each taxpayer to apply his tax on the road by his barn or in front of his house or leading to his pasture. Concentration of road-work is needed. Too much of our taxes has been dumped into mud holes, with scarcely any benefits following. Repair roads when the weather is favorable. Not enough economy is practiced in taking care of the work done. The scraper and roller will destroy ruts. It can not be done by the scraper alone. However, we persist in trying it that way. To have a road passable during the wet seasons, do not make the center the lowest part of it. Keep the side ditches and subdrains open and provide outlets for the water.

This subject is so broad and contains so much that it might be discussed in the desultory and disconnected manner which this paper presents it to an almost indefinite length. But, having some regard for your patience, I will conclude by suggesting that much good might be accomplished by holding meetings in each road district, at which the Township Trustee, Road Supervisor and all the taxpayers of the district should be present. A formal organization should be made by selecting a presiding officer and secretary. A map of the road district should be provided. A plan for the season's work should be formulated and adopted and, as nearly as practicable, carried out. Common interest and common good should lead us to lay aside all prejudices and work together in the spirit of unity to lift ourselves out of the mud and place our feet upon substantial highways.

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